

Mark Scheme (Results)

Summer 2010

GCSE

360Science

GCSE Additional Science
Structured Paper B2 (5016H/1H)

GCSE Biology
Structured Paper B2 (5028H/1H)

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Using the Mark Scheme

1. This mark scheme gives you;
 - * an idea of the type of response expected
 - * how individual marks are to be awarded
 - * the total mark for each question
 - * examples of responses that should not receive credit.
2. ; separates points for the award of each mark.
3. / means that the responses are **alternatives** and either answer should receive full credit.
4. () 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.
5. Phrases/words in **bold** indicate that the meaning of the phrase/word is **essential** to the answer.
6. OWTTE (or words to that effect) and eq (equivalent) indicate that valid alternative answers (which have not been specified) are acceptable.
7. 'Ignore' means that this answer is not worth a mark but does not negate an additional correct response.
8. 'Reject' means that the answer is wrong and negates any additional correct response for that specific mark.
9. ORA (or reverse argument) indicates that the complete reverse is also valid for the award of marks.
10. ecf (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.

Marking

1. Suggestion/explanation questions should be marked correct even when the suggestion is contained within the explanation.
2. **Do not** award marks for repetition of the stem of the question.
3. 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 scientific context.

Amplification

1. In calculations, full credit must be given for a bold, correct answer. If a numerical answer is incorrect, look at the working and award marks according to the mark scheme.
2. Consequential marking should be used in calculations. This is where a candidate's working is correct but is based upon a previous error. When consequential marks have been awarded write "ecf" next to the ticks.
3. If candidates use the mole in calculations they must be awarded full marks for a correct answer even though the term may not be on the syllabus at their level.
4. If candidates use chemical formulae instead of chemical names, credit can only be given if the formulae are correct.

Question Number	Answer	Additional Guidance	Mark
1(a)	<p>Any two from:</p> <ol style="list-style-type: none"> 1. (muscle cells) respire more; 2. (so cells) need more glucose; 3. (so cells) need more oxygen; 4. increased rate of blood flow required; 5. to remove more heat (from muscles); 6. (cells) produce more/ remove more carbon dioxide (from the muscle cells); 7. because the pH of the blood is lower/more acidic; 8. correct ref. to removal of lactic acid ; 	<p>Accept: muscles need/use more energy</p> <p><i>NB pumping more oxygenated blood to the muscles faster = MP3 and 4</i></p> <p>Accept: pump blood faster/ pump more blood</p> <p><i>NB 'heart rate increases' in stem</i></p> <p>Accept: correct ref. to reduction in anaerobic / reduce chance of cramp/ reduce oxygen debt/EPOC/ maintaining aerobic respiration</p>	(2)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	<p>carbon dioxide + water ;</p> <p>in either order</p>	<p>Accept: CO₂ and H₂O</p> <p>Reject: CO₂/CO²/CO</p> <p>Reject: H₂O/H²O</p> <p>Ignore: energy/ATP</p>	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	lactic acid/lactate;	Ignore: energy Reject: if with any other substance	(1)

Question Number	Answer	Additional Guidance	Mark
2(a)	embryonic stem cells can become any kind of (body) cell / tissue / embryonic stem cells are undifferentiated / have no Hayflick limit ;	Ignore: 'they can make / turn into cells /references to organs'	(1)

Question Number	Answer	Additional Guidance	Mark
2(b)	Any two from: <ol style="list-style-type: none"> 1. Replace / grow new limbs / regeneration of (named) body organs / (named) tissue /cells; 2. reduce rejection (after transplant) ; 3. cure / treat genetic disorders/named genetic disorders/Parkinson's disease / diabetes/ arthritis / cancer /Alzheimer's ; 4. test new drugs / medicines; 5. knowledge of (human) development; 	Accept: make new skin for burn victims. Accept - create organ banks.	(2)

Question Number	Answer	Additional Guidance	Mark
2(c)	Any two from: <ol style="list-style-type: none"> 1. life starts at fertilisation / embryos are humans; 2. (because they are alive) embryos have rights 3. money/embryos should be used for other (medical) purpose/ alternative/named research 	accept: an embryo is a potential life/ it is a living thing Ignore: just expensive ignore: It is wrong / against God / embryo feels pain / damages embryo	(2)

Question Number	Answer	Additional Guidance	Mark
3(a)	carbon dioxide / CO ₂ ;	reject CO ₂ / CO ² /CO	(1)

Question Number	Answer	Additional Guidance	Mark
3(b)	<p>Any two from:</p> <ol style="list-style-type: none"> 1. (glucose) used in respiration / cell uses (glucose) for energy; 2. (so) low(er) concentration (of glucose) inside cell /high(er) concentration (of glucose) in blood ; 3. (glucose) moves from high concentration to low concentration / down a concentration gradient ; 4. Cell membrane is partially permeable/has small holes in it/glucose leaks out of capillary through holes in wall; 5. by diffusion 	<p>Accept: there is less glucose in the cells/more glucose in the plasma.</p> <p>(must imply diffusion of glucose)</p>	(2)

Question Number	Answer	Additional Guidance	Mark
4(a)	<p>Any two from:</p> <ol style="list-style-type: none"> 1. select the wheat plants with shorter stems / desired characteristics ; 2. cross individual wheat plants (with shorter stems) ; 3. collect seeds and grow offspring ; 4. select and breed those with desired characteristics again/repeat for many generations ; 	<p>If all of answer is about GM/GE/cloning - no marks</p> <p>Accept: collect seeds from short plants Reject - select small seeds</p> <p>Accept: Use the seeds from this cross / plant the seeds from the small plants.</p> <p>Accept: several</p>	(2)

Question Number	Answer	Additional Guidance	Mark
4(b)	<ol style="list-style-type: none"> 1. less energy is used for growth/ energy goes into seed production rather than growth; 2. may have been bred/selected / also have genes for higher yield; 	Accept: less nutrients used for stem growth	(1)

Question Number	Answer	Additional Guidance	Mark
4(c)	<p>Any two from:</p> <ol style="list-style-type: none"> 1. less need to irrigate / less water used / reduces cost of watering / grow in arid regions ; 2. lower use of pesticides / fungicides / needs less spraying ; 3. less prone to weather damage; 4. less waste straw ; 5. less time to grow (so get more than one crop a year); 	<p><i>NB 'produce higher yield' and 'higher tolerance to disease/drought' in stem.</i></p> <p>Ignore: hostile environments</p> <p>Accept: less pest control required</p>	(2)

Question Number	Answer	Additional Guidance	Mark
5(a)	<p>Any two from:</p> <ol style="list-style-type: none"> 1. (mineral salt/ion) in solution / dissolved/in water ; 2. (cell membranes contain) molecular "pumps" ; 3. active transport / uses energy; 4. against concentration gradient /higher concentration in root cells; 	<p>NB root hair cell in stem NB mineral ions from soil in stem</p> <p>Accept: (mineral ions) are pumped in.</p> <p>Accept ref. to diffusion only if it is clear that higher concentration in soil</p>	(2)

Question Number	Answer	Mark												
5(b)	<table border="1"> <thead> <tr> <th>mineral ion absorbed by the plant</th> <th>how it is used by the plant</th> <th>Additional Guidance</th> </tr> </thead> <tbody> <tr> <td>potassium (given)</td> <td>fruit development / flower development / stomata function / to allow max transpiration / strong stem;</td> <td>Accept: grow fruit</td> </tr> <tr> <td>Magnesium / Mg; Accept: nitrate</td> <td>to make chlorophyll:(given)</td> <td></td> </tr> <tr> <td>phosphorus (given)</td> <td>(root) growth ; make DNA/RNA/ ATP/ phospholipids/enzymes/ membranes / proteins; prevent/resist disease; photosynthesis/ respiration;</td> <td></td> </tr> </tbody> </table>	mineral ion absorbed by the plant	how it is used by the plant	Additional Guidance	potassium (given)	fruit development / flower development / stomata function / to allow max transpiration / strong stem;	Accept: grow fruit	Magnesium / Mg; Accept: nitrate	to make chlorophyll:(given)		phosphorus (given)	(root) growth ; make DNA/RNA/ ATP/ phospholipids/enzymes/ membranes / proteins; prevent/resist disease; photosynthesis/ respiration;		(3)
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Question Number	Answer	Additional Guidance	Mark
6	<p>Any four from:</p> <ol style="list-style-type: none"> 1. levels of ammonia increase and then decrease; 2. idea of the increase in ammonia levels is because sewage/organic matter decays; 3. idea of the decrease in ammonia is because it has been changed /oxidised to nitrates ; 4. nitrates absorbed /used by plants/algae/trigger algal bloom ; 5. algae/plants die/decrease due to low light levels /lower mineral concentration; 6. (from outfall) bacteria reduces /uses oxygen ; 7. (low oxygen causes) animals / fish die / aquatic organisms migrate ; 8. just after outfall algae decreases due to high levels of ammonia 9. credit any reasonable suggestion as to why sewage fungus/protozoans populations increase/decrease e.g. protozoa feed off sewage fungus; 	<p>Ignore eutrophication</p> <p>Accept: description of algal bloom, but more than just algae grow.</p>	(4)

Question Number	Answer	Additional Guidance	Mark
7(a)	meiosis;	Take care with spelling Reject any word with a 't' in it - e.g. mitosis	(1)

Question Number	Answer	Additional Guidance	Mark
7(b)	<p>in meiosis:</p> <ol style="list-style-type: none"> 1. produces haploid / 23 / half number of chromosomes ; 2. 4 cells produced ; 3. The daughter cells are genetically different from each other ; 4. two divisions occur; 5. homologous pairs match up; 6. chiasmata/crossing over occurs; 	Accept: daughter cells show variation	(3)

TOTAL MARKS 30

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