

# Mark Scheme (Results)

## Summer 2010

GCSE

360Science

GCSE Biology  
Structured Paper B3 (5029/01)

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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.

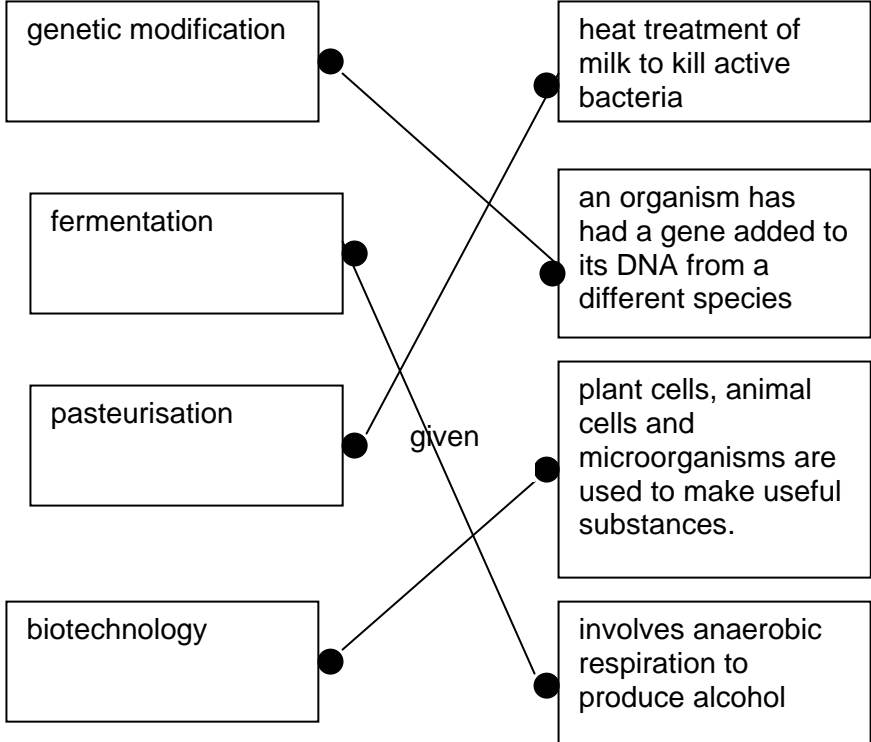
## Marking

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	<p>Any two from</p> <table border="1" data-bbox="328 365 1347 786"> <thead> <tr> <th data-bbox="328 365 639 398">feature</th> <th data-bbox="639 365 1023 398">how it helps to catch fish</th> <th data-bbox="1023 365 1347 398">Accept</th> </tr> </thead> <tbody> <tr> <td data-bbox="328 398 639 432">pointy teeth</td> <td data-bbox="639 398 1023 432">grip/kill/hold onto fish ;</td> <td data-bbox="1023 398 1347 432">sharp teeth</td> </tr> <tr> <td data-bbox="328 432 639 465">powerful jaws</td> <td data-bbox="639 432 1023 465">grip / kill fish ;</td> <td data-bbox="1023 432 1347 465">strong/big</td> </tr> <tr> <td data-bbox="328 465 639 499">long jaws</td> <td data-bbox="639 465 1023 499">to fit in larger fish ;</td> <td data-bbox="1023 465 1347 499"></td> </tr> <tr> <td data-bbox="328 499 639 533">streamlined</td> <td data-bbox="639 499 1023 533">swim fast;</td> <td data-bbox="1023 499 1347 533"></td> </tr> <tr> <td data-bbox="328 533 639 566">powerful tail</td> <td data-bbox="639 533 1023 566">swim faster ;</td> <td data-bbox="1023 533 1347 566">big/long/strong</td> </tr> <tr> <td data-bbox="328 566 639 600">strong legs</td> <td data-bbox="639 566 1023 600">to move fast ;</td> <td data-bbox="1023 566 1347 600">allow swim</td> </tr> <tr> <td data-bbox="328 600 639 633">good eyesight</td> <td data-bbox="639 600 1023 633">see fish underwater ;</td> <td data-bbox="1023 600 1347 633"></td> </tr> <tr> <td data-bbox="328 633 639 712">green skin/light underbelly</td> <td data-bbox="639 633 1023 712">camouflaged</td> <td data-bbox="1023 633 1347 712"></td> </tr> <tr> <td data-bbox="328 712 639 786">camouflage</td> <td data-bbox="639 712 1023 786">fish don't see them until too late ;</td> <td data-bbox="1023 712 1347 786"></td> </tr> </tbody> </table> <p data-bbox="328 819 756 853">One mark for each correct row</p> <p data-bbox="328 887 1286 920">Ignore references to binocular vision/wide field of view/quick reactions</p>	feature	how it helps to catch fish	Accept	pointy teeth	grip/kill/hold onto fish ;	sharp teeth	powerful jaws	grip / kill fish ;	strong/big	long jaws	to fit in larger fish ;		streamlined	swim fast;		powerful tail	swim faster ;	big/long/strong	strong legs	to move fast ;	allow swim	good eyesight	see fish underwater ;		green skin/light underbelly	camouflaged		camouflage	fish don't see them until too late ;		(2)
feature	how it helps to catch fish	Accept																														
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Question Number	Answer	Mark
2	<p>All 3 lines - 2 marks 1 or 2 lines correct - 1 mark</p>  <p>genetic modification</p> <p>heat treatment of milk to kill active bacteria</p> <p>fermentation</p> <p>an organism has had a gene added to its DNA from a different species</p> <p>pasteurisation</p> <p>plant cells, animal cells and microorganisms are used to make useful substances.</p> <p>biotechnology</p> <p>involves anaerobic respiration to produce alcohol</p> <p>given</p>	(2)

Question Number	Answer	Mark
3	<ol style="list-style-type: none"> <li>1. milk ;</li> <li>2. bacteria ;</li> <li>3. lower ;</li> <li>4. shape ;</li> <li>5. set ;</li> </ol>	(5)

Question Number	Answer	Additional Guidance	Mark
4(a)	weight / mass / tail length /hair length/time of day/temperature ;	accept any other reasonable quality that a scientist would measure ;  Do not accept length as it is in the stem of the question	(1)

Question Number	Answer	Mark
4(b)	Any two of :  1. idea of being suited to/more familiar with surroundings ; e.g. recognise area / smells familiar / know that it is in its territory ;  2. idea of less threatened ;  3. can find way back to burrow easily ;  4. less likely to fight neighbour ;  5. less likely to be eaten by predator ;  6. can find food (more easily) ;	(2)

Question Number	Answer	Mark
4(c)	Any two from:  1. goes in (to trap) by chance ;  2. finds food;  3. associates trap with food/ food reinforces behaviour;  4. even if no food in trap will still go in ;  5. this is an example of learned behaviour ;	(2)

Question Number	Answer	Additional guidance	Mark
5(a)	1. working eg $120/2^2$ or $120/4$ ; 2. (Body mass index =) 30 ;  <b>Note:</b> answer of 30 on own = 2 marks	ecf	(2)

Question Number	Answer	Additional guidance	Mark
5(b)	Any two from: 1. blood pressure high/hypertension; 2. Atherosclerosis/arteriosclerosis/'clogged' arteries/blood vessels; 3. heart disease/heart attack; 4. stroke; 5. diabetes; 6. accept other related health consequences of being obese e.g. out of breath easily/joint problems/arthritis ; 7. cancer of breast/ uterus / womb /colon / intestine/kidney / oesophagus	accept narrowed arteries Ignore veins/capillaries      accept not able to exercise for very long   accept gullet / bowel  ignore: cancer	(2)

Question Number	Answer	Additional Guidance	Mark
6(a)	getting food/insects /grubs from holes / cracks ; accept getting other animals out of shells / sand	Answers must make clear that the spine is being used to access food from a place that was otherwise inaccessible  ignore ref. to sucking	(1)

Question Number	Answer	Additional Guidance	Mark
6(b)	it is an object (from the environment) used to do a job/named job ;		(1)

Question Number	Answer	Additional Guidance	Mark
6(c)	seeds float / sand sinks in the water ; sand is washed off / separated from the seed	Ignore use water to clean/wash seeds	(1)



Question Number	Answer	Additional Guidance	Mark
7(a)	genetic identical / no rejection ; reverse argument	Ignore ethical arguments	(1)

Question Number	Answer	Additional Guidance	Mark
7(b)	produce / increase levels of dopamine ;		(1)

Question Number	Answer	Additional Guidance	Mark
7(c)	brain stem cells will not produce insulin / pancreatic cells / only develop into brain cells/embryonic stem cells are needed ;	Accept adult stem cells are multipotent/not totipotent	(1)

Question Number	Answer	Additional Guidance	Mark
8(a)	<p>Any two from</p> <ol style="list-style-type: none"> <li>1. with each investigation less time is spent on the blue</li> <li>2. by the 5<sup>th</sup>/6<sup>th</sup> minute/end no preference for colour was shown</li> <li>3. credit mathematical manipulation of data for 1 mark e.g. <math>55/30 = 1.8</math> times more on blue squares in 1<sup>st</sup> attempt compared to 6<sup>th</sup> attempt</li> </ol>		(2)

Question Number	Answer	Additional Guidance	Mark
8(b)	stayed on blue squares (significantly) more than on green ;		(1)

Question Number	Answer	Additional Guidance	Mark
8(c)	<p>Any two from:</p> <ol style="list-style-type: none"> <li>1. (at start stayed on blue) went on green every so often / randomly / by mistake ;</li> <li>2. had no adverse effect / learnt that green was not harmful ;</li> <li>3. stopped reacting (negatively) to green ;</li> </ol>		(2)

Question Number	Answer	Additional Guidance	Mark
8(d)	accept any description of abnormal behaviour - e.g. shaking/cowering/ biting when picked up/ in corner/ not sniffing areas/not eating/eat less/not looking for food/erratic behaviour/ distressed/scared/not moving/running around ;	Ignore behaviours that cannot be observed e.g. unhappy	(1)

Question Number	Answer	Additional Guidance	Mark
9(a)	(operant) conditioning/ learned behaviour;	Ignore references to classical	(1)

Question Number	Answer	Additional Guidance	Mark
9(b)	<p>Two from:</p> <ol style="list-style-type: none"> <li>1. desired behaviour is rewarded/it learns to associate the desired action/touching the ball with a reward ;</li> <li>2. the behaviour can be reinforced by further rewards/positive reinforcement ;</li> <li>3. after it learns it carries out the action without needing the reward ;</li> </ol>		(2)

Question Number	Answer	Additional Guidance	Mark
9(c)	<p>One from each:</p> <p><u>For</u></p> <ol style="list-style-type: none"> <li>1. used for education ;</li> <li>2. raise money (for conservation);</li> <li>3. dolphins not harmed/looked after/fed ;</li> <li>4. dolphins safe from predators ;</li> </ol> <p><u>Against</u></p> <ol style="list-style-type: none"> <li>5. some people think that dolphins have rights ;</li> <li>6. dolphins have to be kept in captivity / not their natural environment ;</li> <li>7. exhibit unnatural behaviour ;</li> </ol>	Do not credit entertainment - in the stem of the question	(2)

Question Number	Answer	Additional Guidance	Mark
10(a)	parental (care) / instinctive ;	Accept maternal/innate/inherited	(1)

Question Number	Answer	Additional Guidance	Mark
10(b)	<p>Two from:</p> <ol style="list-style-type: none"> <li>1. more young survive (as she removes them from nest);</li> <li>2. less risk to offspring from predators (as she carries them to the river);</li> <li>3. (more offspring) live to reproduce/ pass on genes</li> </ol>	<p>Accept better chance that young will survive</p> <p>Ignore unqualified reference to protection</p> <p>Ignore references to the young once they are in water e.g. teaches them to swim</p>	(2)

Question Number	Answer	Additional Guidance	Mark
10(c)	increase risk from predator while on river bank / preoccupied with young ;	diverted from natural behaviour e.g. feeding	(1)

Question Number	Answer	Additional Guidance	Mark
11(a)	Any one from  1. (a pack) can surround / circle / take turns to catch prey;  2. (a pack) can catch larger/ more prey ;	accept  increases chance of catching prey / easier to catch prey / food	(1)

Question Number	Answer	Additional Guidance	Mark
11(b)	Any one from  1. if they competed there would not be enough food / resources / mates eq ;  2. avoids conflict (between packs)	accept reduces competition (between packs)	(1)

Question Number	Answer	Additional Guidance	Mark
11(c)	prevent other wolves entering territory for food / mates/ warn off other wolves ;	ignore refs to other animals	(1)

Question Number	Answer	Additional Guidance	Mark
11(d)	to communicate their submission to the leader ;		(1)

Question Number	Answer	Additional Guidance	Mark
11(e)	Any two from:  1. more likely to see/warn each other predators ;  2. more likely to resist / intimidate predators; ORA  3. protect young in (centre of herd) ;	accept less chance of being caught  ignore protection unqualified	(2)

Question Number	Answer	Additional Guidance	Mark
12	<p><b>Two from:</b> <b><u>Advantages</u></b></p> <ol style="list-style-type: none"> <li>1. can produce food nutrient normally missing / combat deficiency disease;</li> <li>2. can produce their own fertiliser ;</li> <li>3. can grow in places where rainfall is low /drought resistance;</li> <li>4. longer shelf life;</li> <li>5. produces own pesticide;</li> <li>6. resistant to disease;</li> <li>7. herbicide resistant;</li> <li>8. increased / higher yield ;</li> <li>9. faster growing ;</li> <li>10. improve texture / flavour / colour;</li> </ol> <p><b>Two from:</b> <b><u>Disadvantages</u></b></p> <ol style="list-style-type: none"> <li>11. eating GM crops may harm health ;</li> <li>12. unforeseen effects on food chains ;</li> <li>13. may transfer genes to wild plants /cross pollination ;</li> <li>14. reduce biodiversity;</li> <li>15. idea of farmers/countries being reliant on GM seeds;</li> </ol>	<p>accept pest resistant</p> <p>accept refs to long term effects/side effects</p> <p>accept increased cost</p> <p>ignore vague references to ethical/unethical</p>	(4)

Question Number	Answer	Additional Guidance	Mark
13(a)	<ol style="list-style-type: none"> <li>1. the crop plant is infected with a bacterium ;</li> <li>2. <i>Agrobacterium (tumefaciens)</i> ;</li> <li>3. (which) is a vector ;</li> <li>4. to carry the (ICP) gene ;</li> </ol>	Accept bacterium enters the plant	(2)

Question Number	Answer	Additional Guidance	Mark
13(b)	<p>Any three from:</p> <ol style="list-style-type: none"> <li>1. crown gall grows in (infected) plant ;</li> <li>2. gall cells contain gene for ICP ;</li> <li>3. tissue / cells cut from gall ;</li> <li>4. grow plantlets</li> <li>5. by asexual reproduction / cloning</li> </ol>	<p>Accept tumour for crown gall</p> <p>tissue culture</p> <p>accept grow plants from the (crown gall) cells</p> <p>ignore refs to cuttings</p>	(3)

Question Number	Answer	Additional Guidance	Mark
14	<p>Any six from:</p> <ol style="list-style-type: none"> <li>1. human insulin gene identified/removed/cut out ;</li> <li>2. restriction enzyme used to cut out gene ;</li> <li>3. plasmid taken from bacterium ;</li> <li>4. same restriction enzyme used to cut plasmids ;</li> <li>5. (insulin) gene sealed/joined to plasmid using ligase;</li> <li>6. sticky ends allow (complementary) bases/genes to match up/join together;</li> <li>7. plasmid inserted into bacterium ;</li> <li>8. in a fermenter bacterium multiplied/grown;</li> <li>9. ref to (qualified) optimum conditions ;</li> <li>10. insulin separated / purified / extracted /collected;</li> </ol>	<p>accept section of DNA for gene</p> <p>'restriction enzyme' in question so must be qualified</p> <p>accept bacterial DNA for plasmid</p> <p>'ligase' in question so must be qualified</p> <p>'sticky ends' in question so must be qualified</p> <p>accept named condition eg temperature, pH</p> <p>Maximum of 4 marks if the order is confused</p>	(6)

TOTAL MARKS 60





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