

Mark Scheme (Results)

Summer 2013

GCSE Biology (5BI3H)  
Paper 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.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- 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.
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## Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(i)</b>	<b>B</b> <input checked="" type="checkbox"/> courtship		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(ii)</b>	avoid injury / do not waste energy	avoid a fight idea of dominance / submission feels threatened  Ignore : female will pick the biggest antlers / respect	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)</b>	An explanation linking <ul style="list-style-type: none"> <li>• protection (of female during birth / of young) / concealment (1)</li> <li>• from predators / until strong enough (to fend for itself) (1)</li> </ul>	safer camouflaged  weather	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(c)(i)</b>	A description including two of the following <ul style="list-style-type: none"> <li>• can eat plants which contain tannins (1)</li> <li>• larger food supply (1)</li> <li>• plants not consumed by other herbivores / less competition from other herbivores / animals (1)</li> </ul>	get more food / less likely to starve / won't starve	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(c) (ii)</b>	A description including <ul style="list-style-type: none"><li>• (flower) attracts insects (1)</li> <li>• which pollinate the flower (1)</li> <li>• Idea that insect - flower relationship is specific (1)</li></ul>	attraction can be specific in terms of colour, size or scent or nectar or pollen  fertilise / reproduce for pollinate  e.g. bee and bee orchid	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(a)</b>	Gametes correctly labelled (1) X X X Y  Female zygote X X Male zygote X Y (1)	X X Y X	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)</b>	<b>A</b> <input checked="" type="checkbox"/> enzymes to help get through the membrane of the egg cell		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(c)</b>	to supply / contain (a large amount of) nutrients / energy (for the zygote / embryo)	food /named nutrient  Ignore references to foetus Reject baby	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(d)</b>	An explanation linking <b>two</b> of the following: <ul style="list-style-type: none"> <li>• rising oestrogen levels (1)</li> <li>• (stimulate production of) LH (1)</li> <li>• (LH) levels increase / when it reaches a set level / peaks (which causes ovulation) (1)</li> </ul>	accept high oestrogen levels / oestrogen peaks / oestrogen released	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(e)</b>	<p>An explanation linking:</p> <ul style="list-style-type: none"> <li>• Uterus lining maintained/ thickened (more) (1)</li> </ul> <p>With one of:</p> <ul style="list-style-type: none"> <li>• Because progesterone levels maintained / progesterone is still produced</li> <li>• So that the embryo can embed on it / So that the uterus lining can supply the embryo with nutrients</li> </ul>	Reject: repairs	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(i)</b>	$(1600 + 1000) - (1400 + 200)$ Or $2600 - 1600$ Or $(1600 - 1400) + (1000 - 200)$ or $200 + 800$ (1)  $= 1000$	2 marks for bald answer       $- 1000$	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(ii)</b>	<p>Description including <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• no (overall) / little effect on cases of meningitis B (1)</li> <li>• (significant overall) decrease in meningitis C (1)</li> <li>• correct manipulation of data (1)</li> </ul>	fluctuates a little / rises and then goes slightly down	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)</b>	<b>A</b> <input checked="" type="checkbox"/> antigens		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(i)</b>	<p>A description linking three of the following</p> <ul style="list-style-type: none"> <li>• inject mammal / named mammal with antigen (1)</li> <li>• (select) B lymphocytes / lymphocyte that produces the (specific) antibody / spleen cells(1)</li> <li>• fuse with tumour / myeloma cells (1)</li> <li>• (to produce a) <u>hybridoma</u> (which divide)(1)</li> <li>• antibodies are isolated / screened(1)</li> </ul>	<p>Accept animal for mammal</p> <p>Accept B cells</p> <p>Accept cancer cells</p> <p>Ignore antibodies produced</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(ii)</b>	<p>An explanation linking <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• antibody (only) attach to cancer cell (1)</li> <li>• drug / radioactive source / toxin bound to antibody / alerts immune system to target cancer cells (1)</li> <li>• no / fewer adverse effect to non cancerous cells (1)</li> </ul>	<p>Accept named effect</p>	<b>(2)</b>



Question Number	Answer	Acceptable answers	Mark
<b>4(a)</b>	13 (1) 65 (%)	Two marks for correct bald answer	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)</b>	innate / instinctive / inherited	Kinesis Ignore positive / negative Reject taxis	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(i)</b>	An explanation linking <b>three</b> of the following: <ul style="list-style-type: none"> <li>the squirrels are marking their territory (1)</li> <li>using chemical markers / chemical signals / pheromones / scent (1)</li> <li>which reduces conflict (1)</li> <li>reduces competition / results in more food for these squirrels / the offspring (1)</li> </ul>	Accept area for territory  Keep other squirrels away / out  Ignore comments re scaring predators away / attracting mates / finding way home.	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(ii)</b>	B habituation		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(iii)</b>	<p>A description including <b>three</b> of the following:</p> <ul style="list-style-type: none"> <li>• random / chance behaviour (1)</li> <li>• (specific / repeated) behaviour rewarded (1)</li> <li>• animal associates (reward with behaviour) (1)</li> <li>• behaviour reinforced (1)</li> <li>• (eventually) behaviour occurs without reward / infrequent reward / learned behaviour(1)</li> </ul>	<p>Credit: operant behaviour in context of squirrels or other animals</p> <p>Trial and error behaviour</p> <p>Accept operant condition in terms of negative reinforcement / punishment</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(a)(i)</b>	<b>C</b> ☒ <i>Fusarium</i>		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(a)(ii)</b>	20 and 13.5 OR 40 and 27 (1)  = 13.0	2 marks for correct bald answer	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(a)(iii)</b>	higher in fibre / source of fibre /  lower in fat (than minced beef)	high in fibre  lower in saturated fat / cholesterol  Reject references to more salt / less protein Ignore refs to more carbohydrate	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b)</b>	<p>An explanation linking two of the following:</p> <ul style="list-style-type: none"> <li>• produce a large (food) supply / quicker food production(1)</li> <li>• rapid population growth of microorganisms (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• produced anywhere in world / large food supply/quicker food production (1)</li> <li>• independent of land /climate conditions / use less land or space(1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• reduced cost of production (1)</li> <li>• use waste products from industrial processes/doesn't incur cost of vet / eq(1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• makes vegetarian food products (1)</li> <li>• as a meat substitute (1)</li> </ul>	<p>grow / reproduce quickly</p> <p>Ignore references to cheaper unless qualified</p> <p>accept animals are not harmed in production</p>	<b>(2)</b>

Question Number	Indicative Content	Mark	
<b>QWC</b>	<b>*5(c)</b>	<p>An explanation including some of the following points:</p> <ul style="list-style-type: none"> <li>• water (cooling) jacket</li> <li>• temperature probe</li> <li>• to maintain an optimum temperature</li>   <li>• inlet pipes for nutrients eg ammonia</li> <li>• to supply microorganism with food source eg materials to make proteins</li>   <li>• oxygen pumped in</li> <li>• for aerobic microorganisms or aerobic respiration</li> <li>• carbon dioxide removed</li>   <li>• pH probe</li> <li>• alkali added to raise pH</li> <li>• maintain optimum pH</li>   <li>• paddles</li> <li>• to evenly distribute nutrients, oxygen and break up clumps of microorganisms</li>   <li>• aseptic conditions</li> <li>• to prevent contamination of the fermenter</li> <li>• reduce competition</li> </ul>	<b>(6)</b>
<b>Level I</b>	<b>0</b>	No rewardable content	
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• a limited explanation which includes one feature of a fermenter with its justification, or two features of a fermenter or two justifications</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• a simple explanation which includes at least <b>two</b> features of the fermenter with justification for their use</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>	
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• a detailed explanation which includes at least <b>four</b> features of the fermenter with justification for their use</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>	

Question Number	Answer	Acceptable answers	Mark
<b>6(a) (i)</b>	flavonoids / bioflavonoids	anthocyanins antioxidants	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(a) (ii)</b>	<b>A</b> <input checked="" type="checkbox"/> a gene from another species		<b>(1)</b>

Question Number	Indicative Content	Mark
<b>QWC</b>	<p><b>*6 (b)</b></p> <p>A description including some of the following points</p> <p><b>genetic modification</b></p> <ul style="list-style-type: none"> <li>• transferring a gene from one organism to another</li> <li>• restriction enzymes to cut the gene out</li> <li>• plasmids used to carry gene</li> <li>• sticky ends to join complementary bases</li> <li>• ligase to join the DNA</li> </ul> <p><b>use of <i>Agrobacterium</i></b></p> <ul style="list-style-type: none"> <li>• <i>Agrobacterium</i> is a vector (for the gene)</li> <li>• the <i>Agrobacterium</i> has a suitable gene added to it</li> <li>• example of a suitable gene eg drought resistance / insect resistance / larger yield / for flavonoids</li> <li>• <i>Agrobacterium</i> naturally invades plant cells</li> <li>• its DNA is incorporated into the plant's DNA</li> </ul> <p><b>production of plants</b></p> <ul style="list-style-type: none"> <li>• plant sprayed with <i>Agrobacterium</i></li> <li>• crown gall (formed)</li> <li>• crown gall is cut into small pieces</li>   <li>• leaf discs are incubated with <i>Agrobacterium</i></li>   <li>• (crown gall tissue / leaf discs) grown in tissue culture</li> <li>• explants</li> <li>• grown into crops</li> </ul>	<b>(6)</b>
<b>Level</b>	<b>0</b>	No rewardable content
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• a limited description of at least <b>one</b> of the areas involved in creating transgenic plants. Steps may be missing or out of sequence.</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• a simple description of at least <b>two</b> of the areas involved in creating transgenic plants or a detailed description of <b>one</b> area involved in creating transgenic plants</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• a detailed description of the genetic modification, use and production of transgenic plants. Steps should be in sequence.</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>

Question Number	Answer	Acceptable answers	Mark
<b>6(c)</b>	<p>An explanation of one advantage for <b>two</b> marks</p> <ul style="list-style-type: none"> <li>• crop produces a toxin that kills insects (that eat plant)(1)</li> <li>• so less damage by insect / increased crop yield (1)</li> <li>• less man-made chemicals used / specific to pests / less pollution (1)</li> </ul> <p>An explanation of one disadvantage for <b>two</b> marks</p> <ul style="list-style-type: none"> <li>• cross pollination / fertilisation with other plants (species) (1)</li> <li>• producing weeds that contain the toxin(1)</li> <li>• non target organisms may be affected (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• idea of large areas of monocultures (1)</li> <li>• reduction in insect numbers / biodiversity (1)</li> <li>• negative impact on food chains (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• GM crops cost more (1)</li> <li>• Farmers cannot afford them / become reliant on them (1)</li> </ul>	<p>accept references to ICP</p> <p>accept does not kill other insects</p>	<b>(4)</b>



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