



GCSE

## Biology A

General Certificate of Secondary Education

Unit **A221/02**: Modules B1, B2, B3 (Higher Tier)

## Mark Scheme for June 2012

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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**Annotations**

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
<b>not/reject</b>	answers which are not worthy of credit
<b>ignore</b>	statements which are irrelevant – applies to neutral answers
<b>allow/accept</b>	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	no benefit of doubt

<span style="border: 1px solid red; padding: 2px;">R</span>	reject
	correct response
<span style="border: 1px solid red; padding: 2px;">S</span>	draw attention to particular part of candidate's response
<span style="border: 1px solid red; padding: 2px;">^</span>	information omitted

**Subject-specific Marking Instructions**

- If a candidate alters his/her response, examiners should accept the alteration.
- Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

Eg

For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

## c. The list principle:

If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, eg one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

## d. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

Eg If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	✗	✓	✓	✓	✓			✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	✗		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

e. For answers marked by levels of response:

- i. **Read through the whole answer from start to finish**
- ii. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
- iii. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

- iv. Use the **L1, L2, L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question		Answer	Mark	Guidance																
1	(a)	Enzymes (1) proteins (1)	2	deduct 1 mark for each additional response <b>accept</b> any clear indication of responses eg. ticks, underlined																
	(b) (i)	dominant	1	if more than 1 response = 0 marks <b>accept</b> any clear indication of a response eg. tick, underlined																
	(ii)	50%	1	if more than 1 response = 0 marks accept any clear indication of a response eg. tick, underlined																
	(c)	<table border="1"> <tr> <td>The first generation only has males with Huntington's disorder.</td> <td></td> </tr> <tr> <td>Males can inherit the disorder from their mother.</td> <td>✓</td> </tr> <tr> <td>Huntington's disorder is passed on through the genes.</td> <td></td> </tr> <tr> <td>The symptoms of the disorder do not appear until a person is in their forties.</td> <td></td> </tr> <tr> <td>Both males and females can have Huntington's disorder.</td> <td>✓</td> </tr> <tr> <td>Huntington's disorder affects nervous tissue.</td> <td></td> </tr> <tr> <td>There are two alleles for the gene that can cause Huntington's disorder.</td> <td></td> </tr> <tr> <td>Females can inherit the disorder from their father.</td> <td>✓</td> </tr> </table>	The first generation only has males with Huntington's disorder.		Males can inherit the disorder from their mother.	✓	Huntington's disorder is passed on through the genes.		The symptoms of the disorder do not appear until a person is in their forties.		Both males and females can have Huntington's disorder.	✓	Huntington's disorder affects nervous tissue.		There are two alleles for the gene that can cause Huntington's disorder.		Females can inherit the disorder from their father.	✓	3	<b>accept</b> any clear indication of responses eg. crosses if ticks not shown, shaded boxes  if more than 3 responses deduct 1 mark for each additional response
The first generation only has males with Huntington's disorder.																				
Males can inherit the disorder from their mother.	✓																			
Huntington's disorder is passed on through the genes.																				
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	(d) (i)	<b>child</b> inherits recessive/normal allele from her mother (1) <b>child</b> inherits recessive/normal allele from her father (1)	2	<b>ignore</b> reference to Jane as a heterozygote <b>accept</b> converse argument clear reference to both parents in correct context = 2 marks <b>accept</b> child only has recessive alleles = 1 mark																
	(ii)	Jane AND Wendy	1	<b>accept</b> in either order																
		<b>Total</b>	10																	

Question		Answer	Mark	Guidance
2	(a)	<p>any 2 from:</p> <p>idea of chest infections/coughing/breathing difficulties; thick/build up of/ too much mucus/ production of phlegm; difficulty digesting food/digestive system not working correctly/ difficulty in gaining weight/ large (smelly) stools; sterility;</p>	1	<p><b>2 correct</b> responses = 1 mark</p> <p>mark responses across the two lines available, treat responses as a list</p> <p><b>accept</b> correct reference to pancreas, if qualified</p> <p><b>accept</b> any other correctly named symptom eg. sinusitis, arthritis, incontinence, diabetes, skinny/thin</p> <p><b>ignore</b> weight loss</p>
	(b) (i)	6	1	<p>if more than 1 response = 0 marks</p> <p><b>accept</b> any clear indication of a response</p>
	(ii)	2	1	<p>if more than 1 response = 0 marks</p> <p><b>accept</b> any clear indication of a response</p>
	(iii)	1 AND 5	1	<p>if more than 2 responses = 0 marks</p> <p><b>accept</b> any clear indication of responses</p>
	(iv)	2	1	<p>if more than 1 response = 0 marks</p> <p><b>accept</b> any clear indication of a response</p>
	(c)	<p><b>decision</b> to have the test or not/ to abort or not (1)</p> <p><b>impact</b> of decision - lots of people/ parents/ other children will be affected if the baby has cystic fibrosis/ life implications for baby (1)</p>	2	OWTTE
		<b>Total</b>	<b>7</b>	

Question		Answer	Mark	Guidance
3	(a) (i)	8	1	if more than 1 response = 0 marks <b>accept</b> any clear indication of a response
	(ii)	3	1	if more than 1 response = 0 marks <b>accept</b> any clear indication of a response
	(iii)	5	1	if more than 1 response = 0 marks <b>accept</b> any clear indication of a response
	(iv)	1	1	if more than 1 response = 0 marks <b>accept</b> any clear indication of a response
	(v)	2	1	if more than 1 response = 0 marks <b>accept</b> any clear indication of a response
	(vi)	6	1	if more than 1 response = 0 marks <b>accept</b> any clear indication of a response
	(b)	<i>any five from:</i> first tested on <b>human/animal</b> cells/tissues (1) then tested on animals/ variety of animals (1) then tested on patients/ humans/ people/ volunteers (1) blind/ double blind/ open (label) trials (1) correct explanation of blind/ double blind/ open trial (1) ideas/ details of safety/ testing for side-effects (1) ideas/ details of effectiveness/ how well the vaccine works (1)	5	<b>ignore</b> an individual response if in incorrect order <b>ignore</b> references to unqualified cells  <b>ignore</b> references to use of a placebo
		<b>Total</b>	<b>11</b>	

Question		Answer	Mark	Guidance
4	(a)	mutations	1	
	(b)	<p>...in body cells can be...</p> <p>...caused by natural selection</p> <p>...all environmental factors can change...</p> <p>...may produce new characteristics</p> <p>...sexual reproduction changes genes</p> <p>...caused by artificial selection</p> <p>...in sex cells can be passed</p>	2	<p>if more than 2 responses deduct 1 mark for each additional response</p> <p><b>accept</b> any clear indication of responses eg. crosses if ticks not shown, shaded boxes</p>
	(c)	environmental change (1) mutations (1) natural selection (1)	3	<p>if more than 3 responses deduct 1 mark for each additional response</p> <p><b>accept</b> any clear indication of responses eg. ticks, underlined</p>
		<b>Total</b>	<b>6</b>	

Question		Answer	Mark	Guidance																
5	(a)	<table border="1"> <tr><td>Variation can be caused by the environment.</td><td><input checked="" type="checkbox"/></td></tr> <tr><td>Variation only occurs between organisms of the same species.</td><td><input type="checkbox"/></td></tr> <tr><td>Variation is caused by natural selection.</td><td><input type="checkbox"/></td></tr> <tr><td>Genetic variation can be passed from parent to offspring.</td><td><input checked="" type="checkbox"/></td></tr> <tr><td>Environmental variation is passed from parent to offspring.</td><td><input type="checkbox"/></td></tr> <tr><td>Variation is only caused by selective breeding.</td><td><input type="checkbox"/></td></tr> <tr><td>Variation does not occur between clones.</td><td><input type="checkbox"/></td></tr> <tr><td>Variation can be caused by genes.</td><td><input checked="" type="checkbox"/></td></tr> </table>	Variation can be caused by the environment.	<input checked="" type="checkbox"/>	Variation only occurs between organisms of the same species.	<input type="checkbox"/>	Variation is caused by natural selection.	<input type="checkbox"/>	Genetic variation can be passed from parent to offspring.	<input checked="" type="checkbox"/>	Environmental variation is passed from parent to offspring.	<input type="checkbox"/>	Variation is only caused by selective breeding.	<input type="checkbox"/>	Variation does not occur between clones.	<input type="checkbox"/>	Variation can be caused by genes.	<input checked="" type="checkbox"/>	3	<p>if more than 3 responses deduct 1 mark for each additional response</p> <p><b>accept</b> any clear indication of responses eg. crosses if ticks not shown, shaded boxes</p>
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	(b)	<table border="1"> <tr><td>The transfer of information between different organisms.</td><td><input type="checkbox"/></td></tr> <tr><td>Showing how artificial selection took place.</td><td><input type="checkbox"/></td></tr> <tr><td>Transferring energy from the Sun into food.</td><td><input type="checkbox"/></td></tr> <tr><td>The extinction of a species.</td><td><input type="checkbox"/></td></tr> <tr><td>The future development of food crops.</td><td><input checked="" type="checkbox"/></td></tr> <tr><td>The production of new medicines.</td><td><input checked="" type="checkbox"/></td></tr> </table>	The transfer of information between different organisms.	<input type="checkbox"/>	Showing how artificial selection took place.	<input type="checkbox"/>	Transferring energy from the Sun into food.	<input type="checkbox"/>	The extinction of a species.	<input type="checkbox"/>	The future development of food crops.	<input checked="" type="checkbox"/>	The production of new medicines.	<input checked="" type="checkbox"/>	2	<p>if more than 2 responses deduct 1 mark for each additional response</p> <p><b>accept</b> any clear indication of responses eg. crosses if ticks not shown, shaded boxes</p>				
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	(c)	meeting needs of people today/ maintaining biodiversity/ idea of saving species/ named example of a sustainable process eg. replacement planting of trees, selective harvesting of fish, recycling a <b>specific</b> resource (1)  for future use / generations (1)	2	OWTTE																
	(d)	credit any correct example eg. Dodos	1	<b>reject</b> dinosaurs																
			Total	8																
			Paper Total	42																

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