



## **GCSE**

### **Biology A**

**Unit A161/01: Modules B1, B2, B3 (Foundation Tier)**

General Certificate of Secondary Education

### **Mark Scheme for June 2014**

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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
<u>words</u>	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	correct response
	incorrect response
	benefit of doubt
	no benefit of doubt
	error carried forward
	indicate level awarded for a question marked by level of response
	information omitted
	contradiction
	reject
	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

**ADDITIONAL OBJECTS:** You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

**Subject-specific Marking Instructions**

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- b. 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.

e.g. for a one-mark question where ticks in the third and fourth boxes are required for the mark:

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

*This would be worth  
1 mark.*

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

*This would be worth  
0 marks.*

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

*This would be worth  
1 mark.*

## c. Marking method for tick-box questions:

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 and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. 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.

*e.g. if a question requires candidates to identify cities in England:*

Edinburgh	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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	✓	✗		✓		✓	✓		✓	
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

d 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		<table border="1"> <tr><td>memory loss</td><td></td></tr> <tr><td>clumsiness</td><td></td></tr> <tr><td>problems with digesting food</td><td>✓</td></tr> <tr><td>production of thick mucus</td><td>✓</td></tr> <tr><td>not able to concentrate</td><td></td></tr> </table>		memory loss		clumsiness		problems with digesting food	✓	production of thick mucus	✓	not able to concentrate		2	allow any indication in correct box (does not have to be ticks)  if more than 2 boxes ticked deduct one mark per extra tick					
memory loss																					
clumsiness																					
problems with digesting food	✓																				
production of thick mucus	✓																				
not able to concentrate																					
			(2)																		
b	i		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td colspan="4" style="text-align: center;">Sharon</td></tr> <tr><td colspan="2"></td><td>T</td><td>t</td></tr> <tr> <td rowspan="3" style="writing-mode: vertical-rl; transform: rotate(180deg);">Eric</td><td>T</td><td>TT</td><td>Tt</td></tr> <tr><td>t</td><td>Tt</td><td>tt</td></tr> </table>		Sharon						T	t	Eric	T	TT	Tt	t	Tt	tt	2	one mark for correct parent genotypes (both Tt)  one mark for correct completion of Punnett Square  ecf for correct completion of Punnett Square from their genotypes  allow tT for Tt
Sharon																					
		T	t																		
Eric	T	TT	Tt																		
	t	Tt	tt																		
				(2)																	
b	ii		0.25 / 1/4 / 25% / 1 in 4 / 1:3		1	ecf from Punnett Square i.e. this probability must match their Punnett Square in (b)(i)  ignore 1 in 3 <b>do not allow</b> 3:1 / 4:1 / 1:4															

Question		Answer	Mark	Guidance
c		identify a positive reason for testing (1)  (idea that) the benefits outweigh the risk (1)	2	allow idea of planning (even though given in the question) do not allow the idea that they want to know if the fetus has the disease unqualified  allow inference that benefit outweighs the risk, e.g. "even though the test may be painful and inaccurate, it is more important to find out if the fetus has cystic fibrosis"  note that mark-points may be linked, e.g. "benefits of being able to plan outweigh the possible problems" = 2 marks
d		unethical / fetus is a living things with rights / should not interfere with nature / may harm the fetus/baby / may a cause a miscarriage (1)	1	allow religious argument do not allow vague references to harm ignore harm to mother/ideas about results being unreliable
		<b>Total</b>	<b>8</b>	

2	a		males: XY females: XX (1)	1	need both for the mark
	b	i	1000 (1)	1	
	b	ii	1200 (2)	2	correct answer = 2 marks  allow one mark for correct working $1.2 \times 1000 / (0.2 \times 1000) + 1000$
	b	iii	female fetuses terminated (1) female fetuses miscarried (1) disease affecting females fetuses (1) X sperm killed / more Y sperm (1) gender selection (1)	2	do not allow 'kill female baby'  do not allow 'more boy sperm' 'female fetuses aborted because they want boys' = 2 marks
			<b>Total</b>	<b>6</b>	

Question		Answer	Mark	Guidance
3		<p><b>[Level 3]</b>            Answer describes the role of genes AND the environment in determining our characteristics AND gives examples of characteristics determined by each. Answer also describes that some characteristics are controlled by both genes and the environment. Quality of written communication does not impede communication of the science at this level.            (5 – 6 marks)</p> <p><b>[Level 2]</b>            Answer describes the role of genes AND the environment in determining our characteristics AND gives at least one examples of characteristics determined by one of these. Quality of written communication partly impedes communication of the science at this level.            (3 – 4 marks)</p> <p><b>[Level 1]</b>            Answer describes the role of genes OR the environment in determining our characteristics. Quality of written communication impedes communication of the science at this level.            (1 – 2 marks)</p> <p><b>[Level 0]</b>            Insufficient or irrelevant science. Answer not worthy of credit.            (0 marks)</p>	6	<p><b>This question is targeted at grades up to E</b></p> <p><b>Indicative scientific points may include:</b></p> <p><b>genetic:</b></p> <ul style="list-style-type: none"> <li>• some characteristics are determined by genes/chromosomes/DNA/alleles</li> <li>• inherited from our parents</li> <li>• examples include blood group, dimples, eye colour, gender</li> </ul> <p><b>environment:</b></p> <ul style="list-style-type: none"> <li>• some characteristics are determined by our environment</li> <li>• not inherited</li> <li>• examples include scars, tattoos</li> </ul> <p><b>both:</b></p> <ul style="list-style-type: none"> <li>• some characteristics are determined by both</li> <li>• examples include height, weight, hair colour</li> </ul> <p>ignore general references to 'looks' and 'behaviour' as examples (as given in stem of question)</p>
		<b>Total</b>	<b>6</b>	

Question		Answer			Mark	Guidance
4	a		Idea of counts over time		1	allow BPM
	b	i	6900		1	mark answer in table as this is what is asked if no answer in the table, mark answer below question
		ii	range: 4970 to 6900		1	allow ecf from <b>bi</b> <b>allow</b> 6900 to 4970
		iii	Alistair Ian Colin Byron		1	ignore numbers
		iv	Ian has only just joined the running club the measurements were only recorded once a person's pulse rate may vary blood pressure measurements were not recorded the men all had different diets	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	2	
					Total: 6	

Question		Answer	Mark	Guidance												
5	a	200.96 / 201.06 / 201.14 / 201.1 / 201 (2)		2 correct answer = 2 marks $3.14 \times 8 \times 8 / \pi \times 8 \times 8 / \pi \times 8^2 = 1$ mark												
	b	<table border="1" data-bbox="460 373 1044 786"> <tr> <td>The greater the clear area, the more bacteria have died.</td> <td>✓</td> </tr> <tr> <td>The bacteria may be resistant to antibiotic C.</td> <td>✓</td> </tr> <tr> <td>Antibiotic A is the least effective.</td> <td></td> </tr> <tr> <td>Water kills more bacteria than any antibiotic.</td> <td></td> </tr> <tr> <td>Antibiotic C must be water.</td> <td></td> </tr> <tr> <td>Antibiotic B is the most effective.</td> <td>✓</td> </tr> </table>		The greater the clear area, the more bacteria have died.	✓	The bacteria may be resistant to antibiotic C.	✓	Antibiotic A is the least effective.		Water kills more bacteria than any antibiotic.		Antibiotic C must be water.		Antibiotic B is the most effective.	✓	3 if more than 3 ticks, delete one mark for each extra tick
The greater the clear area, the more bacteria have died.	✓															
The bacteria may be resistant to antibiotic C.	✓															
Antibiotic A is the least effective.																
Water kills more bacteria than any antibiotic.																
Antibiotic C must be water.																
Antibiotic B is the most effective.	✓															
	c	fair comparison of the antibiotics (1) so there is the same amount of <u>antibiotic</u> (1)		2 <b>allow</b> fair test ora												
	d	to check they're safe/in case they are harmful/may have side effects/may cause allergic reactions/to see if they work (1)		1 do not allow vague statements e.g. 'it might not be good for you'/'it might have an effect'												
		<b>Total:</b> 8														

Question		Answer	Mark	Guidance																		
6		<p><b>[Level 3]</b> Answer includes correct description of the correlation AND describes the correlation between one or more factors and deaths from heart disease. Quality of written communication does not impede communication of the science at this level.</p> <p style="text-align: right;">(5 – 6 marks)</p> <p><b>[Level 2]</b> Answer includes correct description of the correlation AND states one or more factors that would have the same correlation. Quality of written communication partly impedes communication of the science at this level.</p> <p style="text-align: right;">. (3 – 4 marks)</p> <p><b>[Level 1]</b> Answer includes correct description of the correlation OR states one or more factors that would have the same correlation. Quality of written communication impedes communication of the science at this level.</p> <p style="text-align: right;">(1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit.</p> <p style="text-align: right;">(0 marks)</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Indicative scientific points may include:</b></p> <p><b>describing correlation (on graph):</b></p> <ul style="list-style-type: none"> <li>as the amount of animal fat eaten increases, so does the death from heart disease/risk of heart disease increases as you eat more fat</li> <li>positive correlation</li> </ul> <table border="1"> <thead> <tr> <th>factors</th> <th>Correlation of factor &amp; Heart Disease</th> </tr> </thead> <tbody> <tr> <td>smoking</td> <td>more smoking = more heart disease</td> </tr> <tr> <td>salt</td> <td>more salt = more heart disease</td> </tr> <tr> <td>drinking alcohol</td> <td>more alcohol = more heart disease</td> </tr> <tr> <td>high blood pressure</td> <td>higher blood pressure = more heart disease</td> </tr> <tr> <td>stress</td> <td>more stress = more heart disease</td> </tr> <tr> <td>use of drugs</td> <td>more drug use = more heart disease</td> </tr> <tr> <td>age</td> <td>older = more heart disease</td> </tr> <tr> <td>obesity</td> <td>more obese = more heart disease</td> </tr> </tbody> </table> <p>ignore ref to fatty foods/takeaways/meat do not allow 'drinking' unqualified ignore ref to lack of exercise ignore factors if they are linked to an outcome other than heart disease e.g smoking linked to lung cancer</p>	factors	Correlation of factor & Heart Disease	smoking	more smoking = more heart disease	salt	more salt = more heart disease	drinking alcohol	more alcohol = more heart disease	high blood pressure	higher blood pressure = more heart disease	stress	more stress = more heart disease	use of drugs	more drug use = more heart disease	age	older = more heart disease	obesity	more obese = more heart disease
factors	Correlation of factor & Heart Disease																					
smoking	more smoking = more heart disease																					
salt	more salt = more heart disease																					
drinking alcohol	more alcohol = more heart disease																					
high blood pressure	higher blood pressure = more heart disease																					
stress	more stress = more heart disease																					
use of drugs	more drug use = more heart disease																					
age	older = more heart disease																					
obesity	more obese = more heart disease																					
		<b>Total:</b>	6																			

Question			Answer		Mark	Guidance											
7	a	i	flat/no increase initially (1) increases later (1)			2	do not allow if candidates refer to number of animals instead of number of extinctions ignore positive correlation										
		ii	40 000 or above			1											
	b	i	<table border="1"> <thead> <tr> <th><i>Consequence of increased human population</i></th> <th><i>Resulting impact on species</i></th> </tr> </thead> <tbody> <tr> <td>need for food / medicines / clothes</td> <td>plants / animals killed / overhunting</td> </tr> <tr> <td>need for housing / roads / farming land</td> <td>destruction of habitats/specific example e.g deforestation</td> </tr> <tr> <td>pollution/specific example of pollution</td> <td>poisoning / kills animals / plants / destruction of habitats</td> </tr> <tr> <td>humans introduce new species</td> <td>kill others animals /plants / disrupt food webs</td> </tr> </tbody> </table>			<i>Consequence of increased human population</i>	<i>Resulting impact on species</i>	need for food / medicines / clothes	plants / animals killed / overhunting	need for housing / roads / farming land	destruction of habitats/specific example e.g deforestation	pollution/specific example of pollution	poisoning / kills animals / plants / destruction of habitats	humans introduce new species	kill others animals /plants / disrupt food webs	2	one mark for correct consequence or impact two marks only if these are in the same row of the table (as consequence and impact need to be linked)  do not allow vague reference to damage to a species
<i>Consequence of increased human population</i>	<i>Resulting impact on species</i>																
need for food / medicines / clothes	plants / animals killed / overhunting																
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pollution/specific example of pollution	poisoning / kills animals / plants / destruction of habitats																
humans introduce new species	kill others animals /plants / disrupt food webs																
	b	ii	not <b>all</b> extinctions caused by humans/some by natural causes e.g. natural predators, floods, disease			1											
	c		<table border="1"> <tbody> <tr> <td>Preventing extinctions is easy to do.</td> <td></td> </tr> <tr> <td>Many plants and animals are dangerous.</td> <td></td> </tr> <tr> <td>Biodiversity is important for sustainability.</td> <td>✓</td> </tr> <tr> <td>Scientists always work together in teams.</td> <td></td> </tr> <tr> <td>Some plants and animals provide us with vital resources.</td> <td>✓</td> </tr> </tbody> </table>			Preventing extinctions is easy to do.		Many plants and animals are dangerous.		Biodiversity is important for sustainability.	✓	Scientists always work together in teams.		Some plants and animals provide us with vital resources.	✓	2	
Preventing extinctions is easy to do.																	
Many plants and animals are dangerous.																	
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Scientists always work together in teams.																	
Some plants and animals provide us with vital resources.	✓																
			Total:			8											

Question		Answer	Mark	Guidance
8		<p><b>[Level 3]</b> Answer includes similarities AND differences between natural selection and selective breeding. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Answer includes one similarity AND/OR one difference. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Answer includes a feature of EITHER natural selection OR selective breeding. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Indicative scientific points may include:</b></p> <p><b>similarities:</b></p> <ul style="list-style-type: none"> <li>• they are both ways of breeding animals/plants</li> <li>• both produce changes in characteristics</li> <li>• both rely on variation in individuals</li> <li>• resulting from mutation/DNA changes</li> <li>• both select the most favourable characteristics</li> <li>• these characteristics are passed onto offspring</li> <li>• over time more individuals possess the characteristics</li> </ul> <p><b>differences:</b></p> <ul style="list-style-type: none"> <li>• NS occurs naturally and SB is controlled by humans</li> <li>• NS takes longer than SB or a</li> <li>• NS selects traits that are useful to survival and SB selects traits that are useful to humans</li> <li>• allow credit for examples to illustrate the differences</li> </ul>
		<b>Total:</b>	<b>6</b>	

Question		Answer	Mark	Guidance
9	a	from top of diagram: B C A	2	two/three correct = 2 marks one correct = 1 mark
	b	<i>any two from</i> animals are eating the plant/feeding (1) digestion (1) carbon used in body to build new chemicals (1)	2	do not allow the movement/transfer of carbon
	c	<i>any two from</i> decay / decomposition / breakdown (1) of waste material or dead matter (1) recycling (1) microorganisms respire (1)	2	
		<b>Total:</b>	<b>6</b>	

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