GCSE

Biology A

General Certificate of Secondary Education

Unit **A161/02:** Modules B1, B2, B3 (Higher Tier)

Mark Scheme for June 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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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.

For answers marked by levels of response:

a **Read through the whole answer from start to finish**
b **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
c **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

d. 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.

Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	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	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
	incorrect response
ECF	error carried forward
	draw attention to particular part of candidate's response
NBOD	no benefit of doubt
R	reject
	correct response
L1 , L2 , L3	indicate level awarded for a question marked by level of response
Λ	information omitted

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. If a candidate alters his/her response, examiners should accept the alteration.

c. 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 the third <u>and</u> fourth boxes are required for the mark:

This would be worth 1 mark.

This would be worth 0 marks.

This would be worth 1 mark.

d. Marking method for tick-box questions:

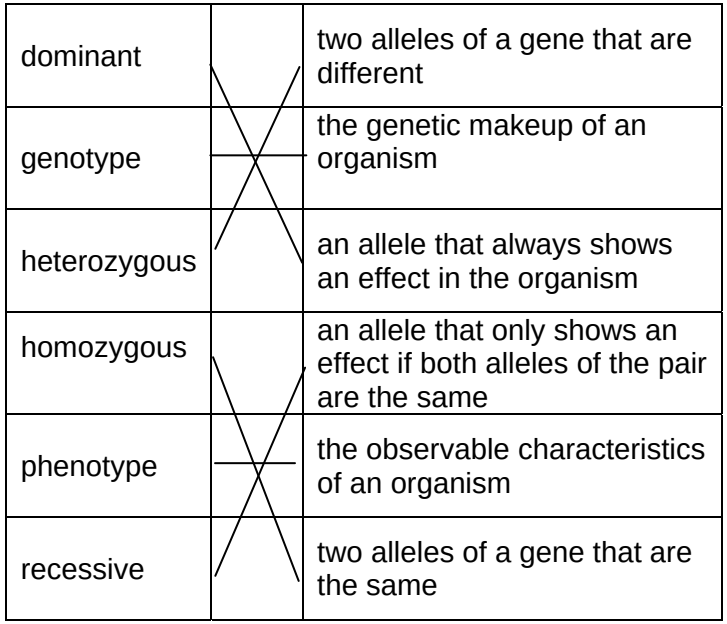
If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.
If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses. Credit should be given according 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.

eg if a question requires candidates to identify cities in England:

Edinburgh	
Manchester	
Paris	
Southampton	

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

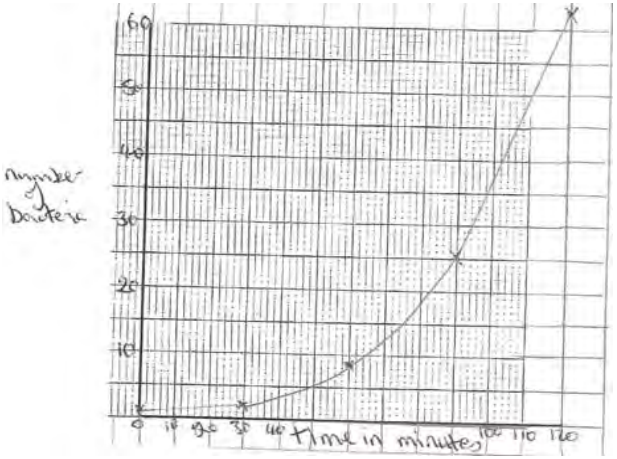
Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

Question			Answer	Marks	Guidance
1	(a)			3	all correct = 3 marks 4 or 5 correct = 2 marks 3 correct = 1 mark
	(b)	(i)	gg Gg; gg gg Gg gg; Gg gg;	3	1 mark for each correct row if no fully correct rows allow 1 mark for all homozygous recessives (gg) correct **accept** alternative letters if clearly upper and lower case used correctly
		(ii)	gg X gg Gg X Gg Gg X gg OR gg X Gg	2	combinations can be in any order **accept** Gg either way round (Gg or gG) all correct = 2 marks 2 correct = 1 mark

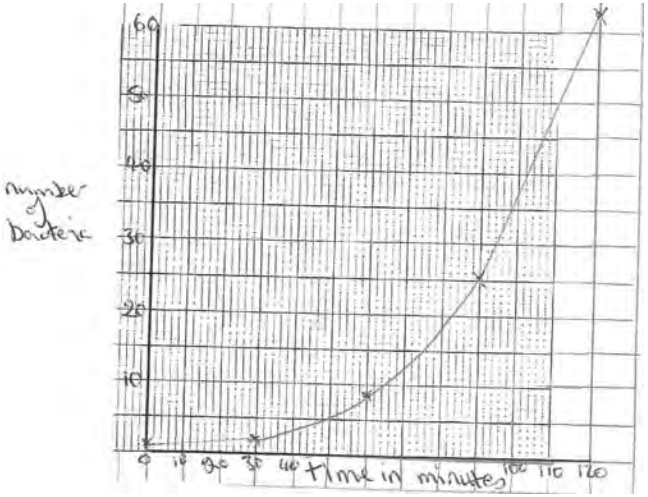
Question			Answer	Marks	Guidance
	(c)		risk of test egrisk of miscarriage/risk of infection/harm to fetus/risk to mother; will they terminate/abort; false negatives and positive results/test is not 100% accurate;	3	must have the idea of harm to mother or fetus do not allow “affect” fetus **accept** idea of not keeping the fetus do not credit references to ethical or financial considerations
			Total	**11**	

Question			Answer	Marks	Guidance
2			**Level 3 (5–6 marks)** **Explains** how clones can be formed in plants **and** animals. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** **Explains** how clones can be formed in plants **or** animals. Quality of written communication partially impedes communication of the science at this level. **Level 1 (1–2 marks)** Shows understanding of what is meant by clones and gives examples in plants and/or animals Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to A** **Indicative scientific points at Level 2 and 3 may include:** **Animals** • twins fertilised zygote separates, both halves develop into an individual (natural) • Greenfly reproducing asexually (natural) • nucleus of body cell transferred to empty egg cell (artificial) **Plants** • description of the formation of a runner/bulb (natural) • description of tissue culture or taking a cutting (artificial) **Indicative scientific points at Level 1 may include:** • clones are genetically identical • produced by asexual reproduction • human identical twins • runners or bulbs • (tissue culture) taking a cutting • nuclear transfer Ignore references to bacteria/mayfly **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td>
<table>
<tr><td>With a very low income, women are certain to get heart disease.</td><td></td></tr>
<tr><td>In women, each time income is halved, the risk of heart disease is doubled.</td><td></td></tr>
<tr><td>Men are more at risk of heart disease than women.</td><td>✓</td></tr>
<tr><td>With a high income, women are more at risk of heart disease than men.</td><td></td></tr>
<tr><td>There are other risk factors for heart disease apart from income.</td><td></td></tr>
<tr><td>No one at high income gets heart disease.</td><td></td></tr>
<tr><td>For men, the lower the income the greater the risk of heart disease.</td><td>✓</td></tr>
<tr><td>From middle to high income, the risk for women remains unchanged.</td><td>✓</td></tr>
</table>
</td><td>3</td><td>if more than three boxes are ticked deduct one mark for each additional tick</td></tr>
<tr><td></td><td>(b)</td><td></td><td>C;
4;</td><td>2</td><td>accept any unambiguous indication using lines on table</td></tr>
<tr><td></td><td>(c)</td><td></td><td>
<table>
<tr><td>All the men should be the same height.</td><td></td></tr>
<tr><td>Both men and women should be chosen at random</td><td>✓</td></tr>
<tr><td>The sample size should be as large as possible</td><td>✓</td></tr>
<tr><td>The woman should all have a high income.</td><td></td></tr>
<tr><td>Only people with a history of heart disease should be included.</td><td></td></tr>
<tr><td>The two groups should be checked that they match on as many factors as possible.</td><td>✓</td></tr>
<tr><td>The study should be a double blind trial.</td><td></td></tr>
</table>
</td><td>3</td><td>if more than three boxes are ticked deduct one mark for each additional tick</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>8</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4</td><td>(a)</td><td>(i)</td><td> 
</td><td>2</td><td>axis correctly plotted = 1 mark

4 or 5 plots correct for their axes = 1 marks

<table><tr><th>Time in minutes</th><th>Numbers of bacteria</th></tr><tr><td>0</td><td>1</td></tr><tr><td>30</td><td>3</td></tr><tr><td>60</td><td>8</td></tr><tr><td>90</td><td>24</td></tr><tr><td>120</td><td>64</td></tr></table>
bar chart = 0 marks</td></tr>
<tr><td></td><td></td><td>(ii)</td><td> 
</td><td>1</td><td>line is smooth curve through points

not straight lines/ruled dot to dot

ignore extrapolations

if more than one line no mark eg straight line and curve

no mark if bar chart plotted</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>20</td><td>1</td><td>accept 17-22</td></tr>
</table>

Question			Answer	Marks	Guidance
		(iv)	**fast** multiplication; means more cell damage/toxins produced; needs to take antibiotics;	2	
	(b)		'**A**' because bacteria stimulate antibodies production/once antibodies B are produced A goes down	1	**ignore** reference to antibodies 'engulfing' bacteria
	(c)		engulf the bacteria ✓ stop the bacteria entering the body cause the bacteria to mutate cause the bacteria to reproduce digest the bacteria ✓ produce antibodies against the bacteria ✓	2	3 correct = 2 marks 2 correct = 1 mark
	(d)		V; idea that **shape** fits	2	explanation must make reference to shape **accept** "same shape"/lock and key idea do not allow just the idea that they 'stick' together
	(e)	(i)	60-65	1	
		(ii)	memory	1	
		(iii)	first conclusion correct and second incorrect;(1) (first conclusion correct as) **higher/faster** level of antibody response after second infection (1) (second conclusion incorrect as) no information provided about antibiotics/explanation that because of high antibody level Jake does not need antibiotics;(1)	2	**accept** implications that first statement is correct and second incorrect maximum 2 marks
			Total	**15**	

Question			Answer	Marks	Guidance
5			**Level 3 (5–6 marks)** Explain blood pressure is the pressure of the blood on the walls of the arteries. Explains **how** at least one factor affects blood pressure Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Explains why there are two blood pressure numbers. Describes factors as increasing or decreasing blood pressure. Quality of written communication partially impedes communication of the science at this level. **Level 1 (1–2 marks)** Gives examples of factors which cause blood pressure to vary between individuals. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to A/A*** **Indicative scientific points at Level 3 may include:** • arteries have muscular walls to maintain pressure when heart is relaxing • how cholesterol deposits increase blood pressure • how exercise can reduce blood pressure • how aging/hardening arteries increase blood pressure • how nicotine increase blood pressure **Indicative scientific points at Level 2 may include:** • describes blood pressure measurement as two numbers • higher number is when heart is contracting • lower number is when heart is relaxing • 120/80 = normal • Eg increased fitness decreases blood pressure **Indicative scientific points at Level 1 may include:** • weight/fitness/age/stress/inheritance/drugs/smoking/salt/fat • genetic Ignore references to poor/healthy diet. **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	
6	**(a)**	**(i)**	**D**; has both largest population **and** greatest number of different species	2	mark as independent points
		(ii)	**A**	1	
		(iii)	genetic variation/variation within a species	1	**accept** DNA differences

<table>
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<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>
<table>
<tr><td>The ultimate source of energy for food webs is the Sun.</td><td></td></tr>
<tr><td>A new antibiotic is discovered in a rare species of plant.</td><td>✓</td></tr>
<tr><td>A gene is identified that could make crops grow in a drier climate.</td><td>✓</td></tr>
<tr><td>Classification is used to make it easier to identify different organisms.</td><td></td></tr>
<tr><td>Mutations are required for the development of a new species.</td><td></td></tr>
<tr><td>Evidence for evolution comes from the fossil record and from DNA.</td><td></td></tr>
<tr><td>Darwin’s theory of natural selection.</td><td></td></tr>
<tr><td>All living organisms are dependent on other organisms for their survival.</td><td>✓</td></tr>
</table>
</td><td>3</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>any correct example but must include cause and linked effect</td><td>1</td><td>Eg deforestation causes habitat destruction; burning fossil fuels leads to global warming

ignore unqualified reference to “pollution”</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>8</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
7	(a)		**Level 3 (5–6 marks)** Gives a description of evolution AND speciation using key terms. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Gives a description of evolution OR speciation using key terms. Quality of written communication partially impedes communication of the science at this level. **Level 1 (1–2 marks)** Makes a simple statement about evolution OR speciation Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C** **Indicative scientific points on Evolution may include** • Natural selection • variation • mutation • competition • selective survival/survival of best adapted/survival of fittest • reproduction • pass on characteristic/genes **Indicative scientific points on Speciation may include** • population gets **split** into two groups (eg new mountain range or new river etc) • reproductive isolation • different/changed environments • **split** populations become different • different species can not interbreed (eg due to mating seasons/courtship/genetic incompatibility) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	
			Paper Total	**60**	

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