OCR
Oxford Cambridge and RSA

GCSE

Biology A

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

General Certificate of Secondary Education

Mark Scheme for June 2014

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.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

1. **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

2. Available in scoris to annotate scripts:

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

3. **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.

4. 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 <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.

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	
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**

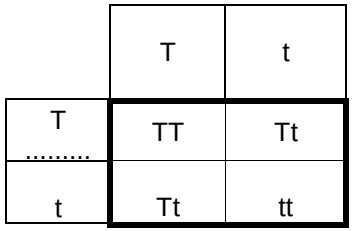
d. For answers marked by levels of response:
   i. **Read through the whole answer from start to finish**
   ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
   iii. **To determine the mark within the level**, consider the following:

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		 Probability = 0.25	3	one mark for **correct** parent genotypes (both Tt/ tT) incorrect genotypes do not credit for ecf marks one mark for correct completion of Punnett Square. Allow correct alternative genetic diagram. one mark for correct probability Use of alternative symbols (as long as upper and lower case of same letter is clear). Max 2 marks. allow 1/4 or 25% or 1 in 4 or 1:3 ignore 1 in 3
	b	i	idea of lots of (fetal) cells / don't need to separate mother's cells from fetal cells	1	ignore more accurate/reliable
	b	ii	less painful / invasive / less risk of miscarriage / less equipment needed	1	accept idea it is safer/easier accept idea that it can be done earlier in the pregnancy

Question			Answer	Mark	Guidance
	c		**[Level 3]** Answer gives reasons from more than two areas why a couple may or may not choose to have the test done. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Answer gives reasons from more than one area why a couple may or may not choose to have the test done. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Answer states a reason why a couple may or may not choose to have the test done. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A*** **Indicative scientific points may include:** **Ethical/moral/religious:** may or may not believe in testing may or may not believe in terminations may or may not be worried about discrimination against a disabled child may or may not believe there should be any interference in nature (idea of playing God) **economic:** may or may not be able to afford care for child / treatment / counselling (since medical services cost in some countries) **medical:** increased risk of miscarriage risk to health of mother as a result of termination risk to health of mother / fetus as a result of testing false negative/positive test. Accuracy of the test. plan for future medical treatment **circumstances:** may or may not have other healthy children to consider may or may not have been trying for a baby for a long time may or may not have had many miscarriages prior to this baby may or may not plan for the future **general:** can make decisions regarding termination may, or may not, want to know whether the child has the disease couples will make different judgements about risks and benefits of the test idea that perception of risk is different to actual risk the quality of life the child/parents will have
			Total	**11**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>2</td><td>a</td><td></td><td>(look at the sex) chromosomes/Karyotype (1)
males: XY and females: XX (1)</td><td>2</td><td>Males have XY chromosomes and females XX chromosomes = 2 marks</td></tr>
<tr><td></td><td>b</td><td></td><td>gene on Y chromosome/SRY gene (1)
leads to formation of testes / testosterone / androgen (1)
absent leads to formation of ovaries/female reproductive system (1)</td><td>3</td><td>‘hormone’ alone is insufficient</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
<tr><td>3</td><td>a</td><td></td><td><table>
<tr><td>a large number of people die from heart disease each year</td><td></td></tr>
<tr><td>having a particular gene does not guarantee that you will develop heart disease</td><td>✓</td></tr>
<tr><td>Tim’s mother does not have heart disease</td><td></td></tr>
<tr><td>Tim’s father and grandfather died from heart disease</td><td></td></tr>
<tr><td>the results of the test can sometimes be incorrect</td><td>✓</td></tr>
<tr><td>there are lots of factors that can contribute to heart disease</td><td>✓</td></tr>
</table></td><td>2</td><td>3 correct = 2 marks
2 correct =1 mark
1 correct = 0</td></tr>
<tr><td></td><td>b</td><td></td><td>if test is positive:
may not get life insurance(1)
may be more expensive (1)</td><td>2</td><td>ora</td></tr>
<tr><td></td><td>c</td><td></td><td>looking for idea that people’s perception of risk is different to the calculated risk:
Idea that Greg does not care/does not understand about the risk of heart disease (1)
Tim has lost members of his family (which is likely to raise his perception of the risk) (1)</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>6</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
4	a		Idea of counts over time	1	Allow BPM
	b	i	6900	1	if no answer written below question, check table
		ii	both correct calculations of pulse rate (1) correct conclusion from their data (1)	2	Byron's is 5440/80 = 68 / Colin is 4970/70 = 71 **Allow ecf for second marking point**
		iii	the pulse rate(measurements) varies /there is insufficient variation in the measurements (1) **any one from:** repeat the measurements (1) take the mean (1) measure time taken to return to resting pulse rate(1) measures the pulse rate over a long time period (1)	2	 ignore discussion of outliers
			Total:	**6**	
5	a		200.96/ 201.06/ 201.14/ 201.1/ 201 (2)	2	correct answer = 2 marks 3.14 x 8 x 8 / π x 8 x8/π x 8^2 = 1 mark

Question			Answer	Mark	Guidance
	b		**[Level 3]** Answer contains: description AND conclusion AND explanation Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Answer contains: description AND conclusion OR description AND explanation OR conclusion AND explanation Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Answer contains a description OR an explanation OR a conclusion. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A*** **Indicative scientific points may include:** **descriptions:** • B has the greatest clear area around it • A has a clear area around it (although not as big as B) • C has no/ smallest clear area around it • water has the same area as C **conclusions:** • B is the most effective antibiotic • A is effective against the bacteria but not as effective as B • suggests C is not effective against the bacteria • water as good as C against bacteria **explanations:** • antibiotics are killing/destroying or inhibiting bacteria • where antibiotics are effective the plate appears clear • bacteria may be resistant to C • mechanism of resistance • water acts as a control • to show that water/paper disc has no effect on the bacteria • allows other results to be compared against it
	c		controls all variables except that which is being investigated (1) Increase confidence in results(1)	2	allow keep everything the same apart from the thing being tested. have trust in results/ to allow results to be compared
	d		**Any 2 from:** (firstly) tested on **human** cells / animals (1) (subsequently) trialled on humans(1) blind trials/use of placebo (1)	2	
			Total:	**12**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>6</td><td>a</td><td>i</td><td>
<table>
<tr><td>……there were fewer species so there were fewer to become extinct.</td><td></td></tr>
<tr><td>……human activity was less damaging to plants and animals.</td><td>✓</td></tr>
<tr><td>……humans were eating all the plants and animals.</td><td></td></tr>
<tr><td>……life on Earth began.</td><td></td></tr>
<tr><td>.....there is not much evidence written down about the plants and animals.</td><td>✓</td></tr>
</table>
</td><td>2</td><td>deduct 1 mark for each additional incorrect answer.</td></tr>
<tr><td></td><td></td><td>ii</td><td>40000 and above</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>iii</td><td>extinctions are (rapidly) increasing (exponentially) and are due to human activities /increasing human population</td><td>1</td><td>allow positive correlation for the trend
For second half allow examples of human activity, e.g. pollution, deforestation, habitat destruction, industrialisation</td></tr>
<tr><td></td><td>b</td><td>i</td><td>captive breeding programmes / protected areas / tracking animals / seed or gene banks / zoos/ cloning</td><td>1</td><td>allow prevent introduction of new species into environment/ elimination of alien species</td></tr>
<tr><td></td><td></td><td>ii</td><td>Any 2 from:
maintains (bio)diversity/food webs or chains/ maintains ecosystems (1)
provide us with valuable resources (1)
(we need to try to conserve these species) so that the resources are there for future generations (1)</td><td>2</td><td>Ignore references to crops</td></tr>
<tr><td></td><td></td><td></td><td>Total:</td><td>7</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
7			**[Level 3]** 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) **[Level 2]** Answer includes one similarity AND/ OR one difference. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** 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) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **similarities**: • they are both ways of breeding animals/plants • both produce changes in characteristics • both rely on variation in individuals • resulting from mutation/DNA changes • both select the most favourable characteristics • these characteristics are passed onto offspring • over time more individuals possess the characteristics **differences**: • NS occurs naturally and SB is controlled by humans • NS takes longer than SB ora • NS selects traits that are useful to survival and SB selects traits that are useful to humans • allow credit for examples to illustrate the differences
			Total:	**6**	

Question			Answer	Mark	Guidance
8	a		from top of diagram: D E A	3	
	b		**Any 2 from:** consumption/digestion/eats/breakdown waste material or dead matter(1) increase the surface area of waste **so** decomposers can decay faster (1) idea of recycling of carbon via respiration/ production of carbon dioxide(1)	2	ignore ref to bacteria as detritivores ignore reference to decay linked to detritivores.
	c		not all of the organism is eaten/named example (hair, bone, claws)/foxes share with other foxes(1) not all of the carbon is digested/ assimilated/ absorbed (1)	2	accept egestion/defecation from fox
			Total:	**7**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553