OCR
RECOGNISING ACHIEVEMENT

GCSE

Biology A

General Certificate of Secondary Education

Unit **A161/01**: Modules B1, B2, B3 (Foundation 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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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	alternative wording
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	draw attention to particular part of candidate's response
^	information omitted

2. Subject-specific Marking Instructions

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

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.

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.	Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.
☐	☐	✓
☐	☐	✓
✓	✓	✓
✓	✓	✓
☐	☐	☐
This would be worth 1 mark.	This would be worth 0 marks.	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 <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**

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)		A sex cell usually has two alleles for each gene. Body cells contain pairs of chromosomes. ✓ Sex cells contain alleles that can be dominant or recessive. ✓ Body cells contain half the normal number of chromosomes. A sex cell usually contains one allele of each gene. ✓ Body cells in males have only Y sex chromosomes. Sex cells in humans always have both X and Y chromosomes.	3	
	(b)		DNA molecules are very long. ✓ A person only has one allele for each gene. Genes are sections of DNA molecules. ✓ Genes are instructions for making fats and carbohydrates. All DNA is found in the cytoplasm of cells. All our characteristics are determined by genes. Genes with a recessive allele always express that allele. Many characteristics are produced by several different genes working together. ✓	3	

Question			Answer	Mark	Guidance
	(c)		**[Level 3]** Correct Punnet square diagram with correct description. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Correct Punnet square diagram with incomplete description. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Punnet square diagram with some explanation but not necessarily completely correct. 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 E** **Indicative scientific points at Level 3 may include:** • explains probability of some or all possible offspring genotypes **Indicative scientific points at Level 2 may include:** • diagram shows both parents as heterozygous • diagram shows offspring as 1 homozygous dominant, 1 homozygous recessive and 2 heterozygous **Indicative scientific points at Level 1 may include:** • Punnet square or line diagram. (not family tree unless both homo and heterozygotes are clearly shown) • four possibilities for offspring shown **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answer	Mark	Guidance
	(d)	(i)	***either*** **Mistake**: it is not possible to predict when we will get disease (1) **Explanations** many other factors involved (1) not all diseases are genetic/inherited (1) ***or*** **Mistake:** It will not make all disease a thing of the past (1) **Explanations** Some diseases are caused by pathogens/bacteria (1) medicines or gene therapies are not available for all (inherited) diseases (1)	2	
		(ii)	No mark for agree / disagree Agree – 2 good reasons eg.... save employers money (1) safety issues at work (1) save insurers money (1) help combat crime (1) Disagree – 2 good reasons eg..... Privacy argument (1) Will not get employment/should be employed because of ability not health (1) Will not get insurance (1) Test may give false positive/negative result (1)	2	**accept** 1 for and 1 against
			Total	**16**	

<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>
<table>
<tr><td></td><td colspan="3">statement applies to…</td></tr>
<tr><td></td><td>adult stem cells only</td><td>embryonic stem cells only</td><td>both</td></tr>
<tr><td>can develop into all types of cell</td><td></td><td>✓</td><td></td></tr>
<tr><td>have the potential to treat some diseases</td><td></td><td></td><td>✓</td></tr>
<tr><td>are produced by humans</td><td></td><td></td><td>✓</td></tr>
<tr><td>produce specialised cells in the early development of an organism</td><td></td><td>✓</td><td></td></tr>
</table>
</td><td>2</td><td>4 correct = 2 marks
3 correct = 1 mark</td></tr>
<tr><td></td><td>(b)</td><td></td><td>DNA/alleles/genes will produce same characteristics in the twins (1)
characteristics will be modified by the environment (1)</td><td>2</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>either
idea that variation between different sets is greater than variation within a set (2)
or
A pair of twins may be different heights (1)
A pair of twins may be the same height (1)
or
Each pair of twins is a similar height (1)</td><td>2</td><td>accept – references to factors affecting height, other than genetics (1)</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>any three from:
Study more sets of twins;
Obtain more information about twins e.g. age/diet/weight/brought up separately;
Repeat the study using girls;
Compare with non-identical twins;</td><td>3</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>9</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
3	(a)		the medicine taken to cure the disease: other microorganisms that take advantage of the situation: damage done to cells: ✓ the length of time that the illness lasts: toxins produced by the microorganism: ✓ people who are ill tend to eat less food:	1	both needed

Question			Answer	Mark	Guidance
	(b)		**[Level 3]** Includes most of the relevant points regarding **mechanism AND immunity**. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Includes most relevant points regarding **mechanism OR immunity**. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Includes vague account ie not enough information. 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:** **Mechanism** • microorganism has antigens • that trigger production of antibodies • by white blood cells • white blood cells can also engulf/digest / clump / neutralise any microorganisms • to kill/destroy microorganism **Immunity** • correct explanation of memory cells • idea of rapid production provides immunity from future infections • idea of specificity. **Use the L1, L2, L3 annotations in Scoris; do not use ticks**
	(c)		benefits outweigh risk (1) idea of greater good for the majority of people / lots of lives could be saved (1)	2	**e.g**. more people saved than die **ignore** reference to cancer kills
	(d)	(i)	how bad the symptoms and effects of flu are (1)	1	**accept** any correct reference to how dangerous / fatal / serious the disease is. **ignore** how severe it is
		(ii)	the greater the fatality rate the more deaths there are (1)	1	**accept** either direction **allow** positive correlation

Question			Answer	Mark	Guidance
		(iii)	*any two from:* people travelled less (so less likely to pass on the flu) (1) people lived in remote communities (1) idea that Russian flu may not have been as infective/less severe strain (1) Russian flu lasted for shorter time (1) smaller population, (worldwide, in early 1800s) (1) possible inaccurate record (in 1800s) (1)	2	**ignore** reference to medicines / vaccinations **ignore** reference to mutation **ignore** references to climate **ignore** references to immunity **accept** ORAs
			Total	**13**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>4</td><td>(a)</td><td></td><td>homeostasis (1)</td><td>1</td><td>accept correct phonetic spellings</td></tr>
<tr><td></td><td>(b)</td><td></td><td>receptor before processing centre (1)
processing centre before effector (1)</td><td>2</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><table><tr><th>Water gained</th><th>Water lost</th></tr><tr><td>(Good) Breakfast</td><td>toilet</td></tr><tr><td>(Orange) juice</td><td>sweat(ing)</td></tr><tr><td>Respiration</td><td></td></tr></table></td><td>3</td><td>within each column any order
5 correct = 3 marks
4 correct = 2 marks
3 correct = 1 mark</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>This only tells him if he is dehydrated on the morning of the race (1)
the test will not predict/indicate/show how much water he will lose during the race (1)</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td><table><tr><td>poor diet</td><td></td></tr><tr><td>stress</td><td></td></tr><tr><td>faulty genes</td><td>✓</td></tr><tr><td>cigarette smoking</td><td></td></tr><tr><td>misuse of drugs</td><td></td></tr></table></td><td>1</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
		(iv)		2	

It proves that there is no correlation between smoking, drinking and heart disease.	
The effect on the body of smoking and drinking cannot be answered using a scientific approach.	
A factor might increase the chance of a particular outcome but does not always lead to it.	✓
Individual cases do not provide convincing evidence for or against a correlation.	✓
The right decision is the one that leads to the best outcome for the greatest number of people.	
There is no plausible mechanism that links smoking and drinking to heart disease.	

			Total	**11**	

Question			Answer	Mark	Guidance
5	(a)		Species (1)	1	
	(b)	(i)	**[Level 3]** There is an explanation of role of predators in survival **and** of how beneficial characteristics are passed on over time. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** There is an explanation of role of predators in survival **or** of how beneficial characteristics are passed on over time. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Vague account, not enough information, may have ideas about differential survival, recognition that difference is caused by natural selection or genes being passed on. 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:** • term “natural selection” used • idea that variation in colouration exists • idea that variation caused by mutation • selection is due to predation • surviving moths reproduce • characteristics/colour passed on to offspring • idea that difference in populations established over many generations • term adaptation correctly used **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answer	Mark	Guidance
		(ii)	**Reason for decrease** peppered moths more visible to predators (1) **Reason for increase** dark moths are less visible so increase in numbers (1)	2	
		(iii)	heat (1) getting rid of waste/excretion/faeces (1) movement (1) respiration (1) not all of the moth is eaten (1)	2	
			Total	**11**	
			Paper Total	**60**	

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