OCR
RECOGNISING ACHIEVEMENT

GCSE

Biology A

General Certificate of Secondary Education

Unit **A162/01**: Modules B4, B5, B6 (Foundation 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.

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:

	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
Λ	information omitted
CON	contradiction
R	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 <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. 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, e.g. 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-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 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	Marks	Guidance
1	(a)		sunlight; build up; energy; break down	4	
	(b)		**any two from** each step contains different molecules / substrates / reactants; each enzyme / substrate molecule has a different / specific shape; molecules must be the correct shape to fit together (into the active site of the enzyme); correct reference to 'lock and key' model;	2	not "same shape" "fit" has to clearly refer to enzyme **and** substrate
	(c)	(i)	**30** (^{o}C) = 40 (units); 45^{o}C = **5** (units)	2	
		(ii)	as the temperature increases the rate of reaction decreases / negative correlation; enzymes not at optimum / stop working	2	**ignore** description of increase from 0 to 30 **allow** denatured
		(iii)	two plots*:* one at 10^{o}C **and** one at 25^{o}C	1	
	(d)	(i)	More water is available. The light intensity is at its highest. ✓ The temperature of the soil is at its highest.	1	
		(ii)	35 (arbitrary units)	1	
		(iii)	the difference would be less; reduced (rate of) photosynthesis (but not as much for respiration)	2	

Question			Answer	Marks	Guidance
		(iv)	10.00-12.00	1	
			Total	**16**	

Question			Answer	Marks	Guidance
2	(a)		… used in respiration. ✓ … converted into starch for storage. ✓	2	
	(b)		amino acids; enzymes	2	
	(c)	(i)	Concentration of solution in arbitrary units / Potato chip 0.0 **D** 0.3 **B** 0.6 **A** 0.9 **C**	2	4 correct = 2 marks 2 or 3 correct = 1 mark 1 or 0 correct = 0 marks
		(ii)	answer between 0.01 – 0.29 (2) between D and B **OR** close to D (1)	2	**ignore** ref. to units **ecf** accept correct value between D and B – based on the values presented in 2(a)(i) = 1 mark max
			Total	**8**	

Question			Answer	Marks	Guidance
3			**Level 3 (5–6 marks)** A good description of **all three** pieces of equipment. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** A good description of **two** pieces of equipment **OR** a basic description of **all three** pieces of equipment. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** A good description of **one** piece of equipment **OR** a basic description of **two** pieces of equipment. 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 may include:** **Quadrats** • a quadrat is a square frame • put quadrat on ground • plant counts in quadrat • random / grid distribution of quadrats • use of a transect line • estimate % plant cover • take several readings in/across the two areas **Light meter** • measures light levels/intensities • hold equipment at ground level • take a reading • take several readings in/across the two areas **Identification key** • compare plants seen to description/image in key • use to find names/species of plants • in each quadrat • compare plant types/species between the two areas • binary/dichotomous choices within key **Additional scientific point** • use a statistical test to support differences. **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

Question			Answer	Marks	Guidance
4	(a)		mitosis	1	
	(b)		**any three from** **cell growth** numbers of organelles increase; chromosomes are copied **mitosis** copies of the chromosomes separate; the **nucleus** divides	3	 **accept** unqualified cell growth = 1 max. mark for this area accept gets bigger, increases in size accept DNA is copied **accept** unqualified mitosis = 1 max. for this area accept DNA divides / splits
	(c)	(i)	**any one from** Idea that behaviour / development is affected (positive or negative); Idea of fairness; Idea of conflict at home (twins or parents)	1	OWTTE
		(ii)	**any three from** repeat the investigation using other pairs of twins; identify two **very** different nursery schools / experiences/ activities / provision; find out what happens in each nursery school and relate this to development; use a longer time period; use identical boy twins; describe the type of testing to be carried out to determine development eg reading age / social skills	3	OWTTE
			Total	**8**	

Question			Answer	Marks	Guidance
5	(a)		**Level 3 (5–6 marks)** Response gives a full and detailed account of the method, and compares expected results. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Response includes both an account of a workable method **and** some basic indication of expected results. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Response includes a basic explanation of either a workable method or expected results. 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 E** **Indicative scientific points may include:** **For method** • put a hole in the side of one of the boxes • remove the lid from the other box / put a large hole in the top of the other box • record the appearance of the cress seedlings before • check to make sure that they are growing with straight stems • put one pot of cress seedlings in one of the boxes and the other pot in the second box • turn on the two lamps • shine light in the side of one of the boxes • shine light from the top of the second box • controlling other factors • monitor room temperature in and outside the boxes • make sure that the pots of cress seedlings are kept moist **For results** • after a suitable time • record the appearance of the cress seedlings after • check to see if they have continued to grow with straight stems or have curved • count the numbers of straight / curved seedlings in each pot • check to see if the curved seedlings are growing towards the side source of light • check to see if the straight seedlings are in the box with the overhead light source • plot or tabulate the results to show a comparison. **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answer	Marks	Guidance
	(b)		**any two from** plants get more light; more photosynthesis / growth / food; plants can compete better	2	OWTTE
			Total	**8**	

Question			Answer	Marks	Guidance
6	**(a)**		receptor; processing centre; effector	3	
	(b)	**(i)**	102	1	
		(ii)	neuron C; fatty sheath speeds up the speed of nerve impulses	2	
		(iii)	experimenter error; equipment error / malfunction	2	

Question			Answer	Marks	Guidance
	(c)		**Level 3 (5–6 marks)** Gives a description of sensory and motor parts of the reflex arc along with correct explanation of the effect of damage on the left side compared to the right side. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Gives a description and explanation perhaps giving detail of a logical sequence, but possibly not detailing a comparison of the two sides. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Gives a basic description of the reflex **or** makes a basic statement of left and right sided responses **or** gives a basic explanation of the response. 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 may include:** **Description** • left senses the heat of the hot plate • right also senses the heat of the hot plate • impulse travels along the sensory neuron on to the motor neuron via the relay neuron on right • impulses transmitted along the sensory neuron and up the spinal cord to the brain on left side **Explanation** • the left motor neuron cannot function due to the damage • the left effector / muscle is not stimulated • muscle does not contract • hand not pulled away. • right side undamaged and operates as normal • the right effector / muscle is stimulated • right pulled quickly away from the hot plate. **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**14**	
			Paper Total	**60**	

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