OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science A

General Certificate of Secondary Education

Unit **A153/02:** Modules B6, C6, P6 (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.

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

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
^	information omitted
CON	contradiction
R	reject

	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

2. 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 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**

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:

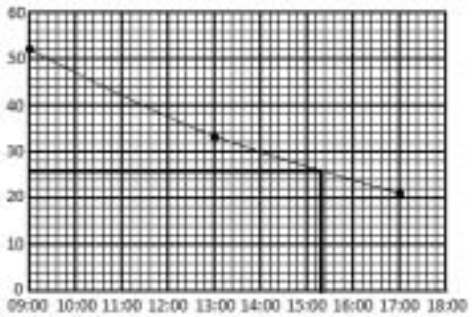
Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

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	Marks	Guidance
1			**Level 3 (5–6 marks)** Identifies procedures linked to correct explanations AND safety aspect Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Identifies procedures **OR** Identifies a procedure with linked to correct explanation **OR** Identifies a procedure and safety aspect. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Identifies a procedure **OR** safety aspect. 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 B** **Indicative Science points may include:** **Procedure** & explanation • **use ionising radiation (gamma/X-Ray)** -Idea that radiation is able to penetrate fruit and packaging. • **use ionising radiation (gamma/X-Ray)**- ionising radiation kills microorganisms • **wrap food in airtight material** - prevent microorganisms getting in after sterilisation. • **leave close to radioactive material -**to give microorganisms a high dose. • **long exposure time-**to give microorganisms a high dose. Ignore references to alpha and beta Ignore get rid of/remove bacteria **Safety Aspects** • shielding/protective clothing • workers don't go near source • workers wear monitoring badges/check ups • workers exposure to radiation is limited to permitted levels. **ignore** safety goggles/masks **ignore** safety aspects linked to consumers
			Total	**6**	

Question			Answer	Marks	Guidance
2	(a)		attempt to use data to halve the activity of the sample(1) estimate half-life of sample within the range 6-6.5 (1)	3	correct statement of half- life of sample is 6 to 6.5 (2) **ignore** technetium's half- life is 6 hours **from table** **"**it has a half- life of 6 hours" =2 because it refers to sample not technetium. **allow for first 2 marking points** :Smooth curve **with construction lines** drawn on graph 
			either recognition that half-life of sample is shorter than Molybdenum/half-life of sample is closer to technetium; **OR** comment on purity/contamination based on data (1)		look for a conclusion which is compatible with their value for half-life
	(b)		benefit: may diagnose what is wrong/detect cancer/has a suitable half-life as a tracer (1) risk: (technetium is radioactive) and may cause ionisation/cancer/mutations/damaging cells (1)	2	**ignore** radiotherapy ideas e.g. kills cells/treats cancer **ignore** safety aspect linked to doctor **ignore** ionising **cells** **ignore** death/damage/harm of person

Question			Answer	Marks	Guidance
	(c)	(i)	**contamination**: Gloves/idea of barrier to stop technetium getting **on** skin/body; **irradiation**: Gloves won't stop radiation /irradiation	2	for contamination mark, must refer to technetium/ sample not gamma/radiation on skin
		(ii)	**two reasons required from:** gamma radiation is the least ionising/(they know) the risk is small/they get paid to do it/benefit to the patient/trained to do job/risks assessed	1	benefit outweighs risk =1 **ignore** time exposed **ignore** monitoring
		(iii)	Alan	1	
			Total	**9**	

Question			Answer	Marks	Guidance
3	(a)		40	1	
	(b)	(i)	136	1	
		(ii)	$^{222}_{86}Rn \rightarrow \alpha + {}^{218}_{84}Po$	1	
			Total	**3**	

Question			Answer	Marks	Guidance
4	(a)		neutron	1	
	(b)		$3.0x10^{-4}$	1	**accept** $3x\ 10^{-4}$,0.0003 , 0.3**g**
			Total	**2**	

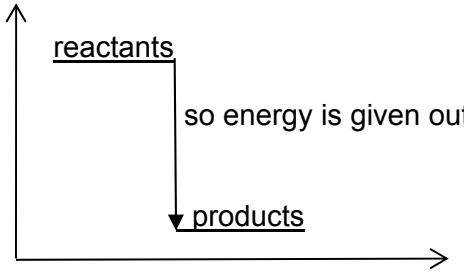
Question			Answer	Marks	Guidance
5	(a)		54m/s line traced up from 9 and then across from line of best fit to 54,+/- half a square	2	correct answer scores 2 marks **accept** answers in the range 52-56 =2 credit correct working out on graph for 1 mark if no value/incorrect value given
	(b)		this neuron does not have a fatty sheath; the speed is very much less	2	**second marking point is dependent on first**
			Total	**4**	

Question			Answer	Marks	Guidance
6	(a)		(helps the animal) find food/find shelter/avoid a predator	1	**accept** movement away from stimulus e.g. light **ignore** new born reflexes e.g. suckling/grasping
	(b)		<table><tr><td>...is given along with a primary stimulus.</td><td>✓</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>...has no direct link to the final response.</td><td>✓</td></tr><tr><td></td><td></td></tr></table>	2	1 mark for each correct tick
			Total	**3**	

Question			Answer	Marks	Guidance
7	(a)		sensory motor sensory transmitter substance	1	3 or 4 correct responses = 1
	(b)		**A C D B**	1	
			Total	2	

Question			Answer	Marks	Guidance
8	(a)		**Level 3 (5–6 marks)** Identification of some features and detailed description of mechanisms to include neurons. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Identification of a feature and an incomplete description of a mechanism Quality of written communication partially impedes communication of the science at this level. **Level 1 (1–2 marks)** Identifies a feature **OR** a statement about the mechanism. 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	**The question is targeted at grades up to A*** **Relevant points include:** **Mechanisms:** • learning involves new neuron pathways forming • repetition will strengthen new pathways • repetition means new pathways are more likely to transmit • damaged area bypassed • brain neurons do not regenerate **Features:** • cerebral cortex identified as part of the brain affected by stroke • cerebral cortex is part of brain concerned with language/communication/speech • neurons in brain • billions of neurons in brain • large number of neurons gives capacity to learn **ignore** reference to the damaged site repairing

Question			Answer	Marks	Guidance
	(b)	(i)	30,000	1	
		(ii)	**any 2 from either section** **argument for yes:** this is a serious condition/life threatening; a lot of people affected; saving money in the long term; increased awareness/education; people could act on advice **argument for no:** correlation (between salt intake and stroke) is not proven; money could be put to better use; people ignore advertising campaign/ignore advice	2	**yes/no scores no mark**, justification must be consistent with decision **allow** a balanced argument, one from the yes section and one from the no section **ignore** references to decreasing risk
	(c)	(i)	Dawn	1	
		(ii)	Dawn	1	
			Total	**11**	

Question			Answer	Marks	Guidance
9	(a)	(i)	20(cm^3) sudden drop/ sudden change in pH	2	**ignore** references to pH 7
		(ii)	3.2	1	
	(b)	(i)	 Marking points: Reactants top left and higher than products bottom right Arrow down **continuous** with reactant and product lines (Arrow) labelled with energy given out	3	correct diagram scores 3 marks **accept** HCl and NaOH for reactants and NaCl and H_20 for products **allow** correct diagrams which show activation energy **ignore** references to exothermic(stem of question)
		(ii)	$H^+ + OH^- \rightarrow H_2O$	2	**accept** correct formula of reactants $H^+ + OH^-$ **in either order** for 1 mark **accept** correct formula of product H_2O for 1 mark **ignore** references to energy
			Total	**8**	

Question			Answer	Marks	Guidance
10	(a)		**Level 3 (5–6 marks)** Recognition that volume rather than concentration has been investigated and a description of how it can be improved. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Some relevant comments made about variables **OR** improvements to method **OR** A relevant comment about a variable and an improvement to a method Quality of written communication partially impedes communication of the science at this level. **Level 1 (1–2 marks)** Makes a relevant comment about a variable **OR** method Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not creditworthy	6	**This question is targeted at grades up to C** **Relevant points include:** **Variables** • control the mass of chips • control the size of chips/surface area of chips • control the volume of reactants • control the temperature • control the shaking **Improvements to Method** • Maintain overall volume and correctly vary concentration of acid. • how to measure rate/measures time • precision of equipment • repetition • Extend range e.g. different concentrations. Accept doing more experiments with different volumes **ignore** fair testing **ignore** testing additional variables

Question			Answer	Marks	Guidance
	(b)		$CaCl_2$	1	number must be subscript, must have correctly cased letters
	(c)	(i)	rate = 0.8 $\frac{40}{50}$	2	correct answer scores 2 marks correct processing but no answer scores 1 **ignore** units
		(ii)	cm^3/s	1	**accept** cm^3 per sec cm^3s^{-1}
	(d)	(i)	twice as many collisions during the… ; twice as many collisions per second ✓ ; collisions which last a shorter time ; collisions are more violent	1	**allow** tick in first box
		(ii)	it makes the reaction quicker. ✓ ; it stops the reaction. ; it makes more product. ; it makes hydrogen.	1	
			Total	**12**	

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