OCR
RECOGNISING ACHIEVEMENT

GCSE

Science A

General Certificate of Secondary Education

Unit **A143/01:** Unit 3: Modules B3, C3, P3 (Foundation Tier)

Mark Scheme for January 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:

	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

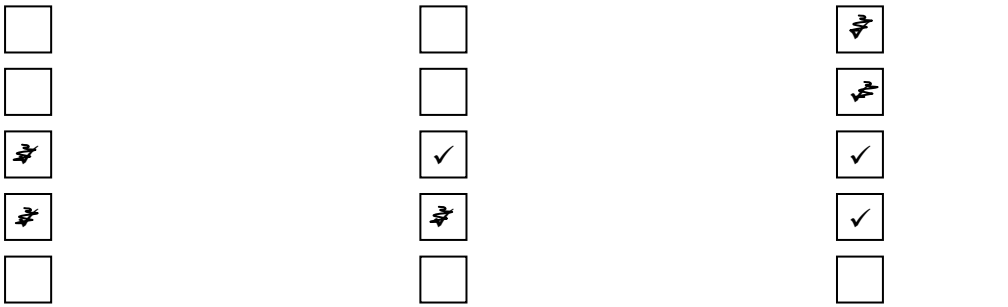
L1 , L2 , L3	indicate level awarded for a question marked by level of response
^	information omitted

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. 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 <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.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>nuclear;</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>any two from
(emits) radiation ;

which is ionising ;

can cause cancer;

which kill / damages / mutates cells or DNA ;</td><td>2</td><td>

ignore mutation / effect on individual animals
ignore mutation alone</td></tr>
<tr><td></td><td>(b)</td><td></td><td>
<table>
<tr><th></th><th>power station</th><th>reactor</th><th>boiler</th><th>turbine</th><th>generator</th><th>Transformer</th></tr>
<tr><td>coal</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>hydro</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>nuclear</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>
</td><td>3</td><td>one mark for each correct row</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>6</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
2	(a)		64; (kWh)	1	
	(b)		640 p / £6.40;	1	ecf from (a) correct units must be present
	(c)		To encourage people to use electricity at night instead of during the day. ✓ Most power stations continue to produce electricity at night. ✓	2	

Question			Answer	Marks	Guidance
	(d)	**(i)**	washing machine ; because uses most energy ;	2	**accept** tumble drier because largest power / watts for (1) ignore ref. to cost
		(ii)	any two from on for only a short time / 5 minutes; doesn't use much energy ; idea of don't need kettle/tea/coffee/other named use of kettle at night time / when sleeping;	2	
			Total	**8**	

Question			Answer	Marks	Guidance
3			**[Level 3]** Identify advantages **and** disadvantages for each lamp. Quality of written communication does not impede communication of the science at this level. (5–6 marks) **[Level 2]** Identify an advantage **and** a disadvantage for each lamp using the table. Quality of written communication partly impedes communication of the science at this level. (3–4 marks) **[Level 1]** Implies an advantage **OR** a disadvantage of a lamp based on the table. 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** Factors to be considered • cost • lifetime • energy input • heat loss • aesthetics e.g. appearance *LE lamp* Advantages may include: – less heat lost / longer life / less input Disadvantages may include: – costs more *QH lamp* Advantages may include: – costs less Disadvantages may include: – more heat lost / shorter life / higher input A direct comparison of a factor may give an advantage for one lamp and a disadvantage for the other. **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>4</td><td>(a)</td><td></td><td>variety
number
variation
different</td><td>2</td><td>all correct = 2 marks
3 or 2 correct = 1 mark</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Conifer trees produce a dense shade. ✓
Ground plants can not photosynthesise as well. ✓</td><td>1</td><td>both needed for the mark</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>…..damaging the Earth for future generations ;</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>planting oak / beech trees;

conserving natural woodlands;</td><td>2</td><td></td></tr>
<tr><td></td><td>(d)</td><td>(i)</td><td>11.8%;</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>idea of lower percentage/amount (of UK) is forest/trees (compared to the rest of the world) ;</td><td>1</td><td>must have comparative statement
accept reverse argument</td></tr>
<tr><td></td><td>(e)</td><td></td><td><table><tr><th></th><th>Bob</th><th>Stu</th><th>neither</th></tr><tr><td>There was the same amount …</td><td></td><td></td><td>✓</td></tr><tr><td>There has been a steep increase …</td><td>✓</td><td></td><td></td></tr><tr><td>The most tree planting …</td><td></td><td></td><td>✓</td></tr><tr><td>There has been an increase followed by a …</td><td></td><td>✓</td><td></td></tr></table></td><td>2</td><td>all correct = 2 marks
3 correct = 1 mark</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>10</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
5	(a)		any two from idea of interpret evidence differently ; Darwin observed living organisms (and Owen didn't) ; idea of different religious beliefs ; idea that scientist are reluctant to give up own ideas;	2	**ignore** ethical/moral reference
	(b)		any two from *(*Archaeopteryx *fossil evidence / it)* shows that these groups must be related / is the 'link' between these two groups; idea of giving **evidence** of the (gradual) change from one to the other; shows reptiles evolved into birds;	2	
			Total	**4**	

Question			Answer	Marks	Guidance
6			**[Level 3]** Describes the processes occurring in each part of the cycle (A, B, C / D). Includes reference to microorganisms linked to their role in C / D. Quality of written communication does not impede communication of the science at this level. (5–6 marks) **[Level 2]** Description of processes occurring in cycle (A, B, C / D) AND Includes relevant reference to role of microorganisms. Quality of written communication partly impedes communication of the science at this level. (3–4 marks) **[Level 1]** Any description of a process in cycle (A, B, C / D) OR Includes relevant reference to microorganisms. 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 A may include:** • uptake of nitrates / nitrogen compounds • through roots (of the plant). **Indicative scientific points at B may include:** • transfer of nitrogen compounds through the food chain • animals eat plants (and other animals) • reference to specific nitrogen compound eg amino acids / protein. **Indicative scientific points at C and D may include:** • death • excretion • decay / decomposition /rot • (by) microorganisms / bacteria / fungi / worms • release nitrates / nitrogen compounds into soil **Ignore** ref to nitrogen fixation / denitrification **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

Question			Answer	Marks	Guidance
7	(a)		<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>It kills bacteria.</td><td>✓</td></tr><tr><td></td><td></td></tr></table>	1	tick in any other box = 0
	(b)	(i)	Julian;	1	
		(ii)	Kate;	1	
		(iii)	Lee ; everything carries a risk / risk of chlorination identified;	2	
			Total	**5**	

Question			Answer	Marks	Guidance
8	(a)	(i)	mining with machines → 99% salt → put in food evaporating water from salt solution → 80% salt 20% grit → put on roads in winter	1	**both** correct links needed for 1 mark
		(ii)	any two from idea of making land unstable; damages habitats; causes pollution qualified:	2	**accept** subsidence / landslide / damage to houses **ignore** kills wildlife e.g. overland pipe work for transport of brine / visual pollution / idea of increased noise / traffic noise / increased CO2
	(b)	(i)	true: ✓ / false: ; true: ; false: ✓ ; true: ✓ / false: ; true: ; false: ✓	2	all 4 rows correct = 2 marks 3 correct rows = 1 mark 2, 1 or 0 correct rows = 0 marks
		(ii)	Salt is a preservative. ✓	1	tick in any other box = 0
	(c)		*sodium hydroxide used for* neutralisation of acids / (making) bleach / (making) soap / (making) paper / (making) cleaning products ; *hydrogen used for* making margarine / (making) hydrochloric acid / fuel;	2	
			Total	**8**	

Question			Answer	Marks	Guidance
9	(a)		chlorine	1	ring around any other element = 0
	(b)		**[Level 3]** Comparisons relating to total energy use and stage(s) of the energy used for PVC and wood **AND** statement**s** about further data Quality of written communication does not impede communication of the science at this level. (5–6 marks) **[Level 2]** A comparison of energy used for PVC and wood **AND** a statement about one type of data needed to complete LCA. Quality of written communication partially impedes communication of the science at this level. (3–4 marks) **[Level 1]** A comparison of energy used for PVC and wood **OR** a statement about one type of data needed to complete LCA. 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** **Conclusions may include:** • total energy used in life time is more for PVC • PVC 22.3 MJ, wood 20.3MJ • allow comparison of energy of different stages **Further data may include:** • raw material • sustainability • environmental impact • carbon footprint. • biodegradability/decomposition • disposal • recyclability • lifespan **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**7**	

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