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 June 2012

Oxford Cambridge and RSA Examinations

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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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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:

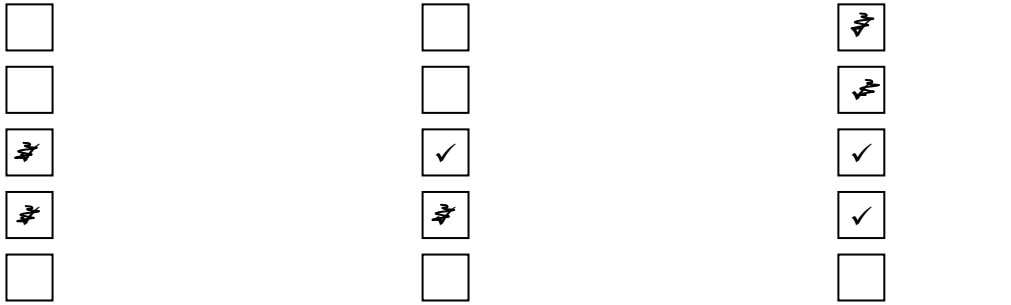
	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
	incorrect response
ECF	error carried forward
	draw attention to particular part of candidate's response
NBOD	no benefit of doubt
R	reject
	correct response
L1 , L2 , L3	draw attention to particular part of candidate's response
^	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.

Question			Answer	Mark	Guidance
1	(a)	(i)	thickest /fattest /largest (line/bar/arrow)	1	**allow** any idea of bigger size
		(ii)	2 (%) (1) percentage is same as oil (smaller than the rest) (1)	2	 **allow** comparison (same or similar) using calculated figure or from size of bars
	(b)	(i)	heat (in steam from power station) / losses in transmission lines/ friction in generators	1	**allow** heat (loss) / noise / lost to air / **ignore** ideas of transporting electricity / distribution / steam losses
		(ii)	0.36	1	if two or more answers circled = 0
		(iii)	coil (of wire) (1); idea of motion of magnet or coil / wire (1)	2	**allow** wire **ignore** iron core
			Total	**7**	

Question			Answer	Mark	Guidance
2	(a)		<table><tr><th></th><th>A</th><th>D</th></tr><tr><td>An accident…</td><td></td><td>✓</td></tr><tr><td>Each tonne…</td><td>✓</td><td></td></tr><tr><td>No CO_2…</td><td>✓</td><td></td></tr><tr><td>Radioactive waste…</td><td></td><td>✓</td></tr><tr><td>Nuclear fuel will …</td><td>✓</td><td></td></tr></table>	2	all correct (2); one error (1); more than one error (0)
	(b)		damages cells / ionises DNA / kills cells /	1	**allow** causes cancer / radiation sickness / burns / mutations **ignore** illness / disease / death / damages tissues
			Total	**3**	

Question			Answer	Mark	Guidance
3			**(Level 3)** States their choice of source and gives a detailed justification based on relevant points from **all** the factors. Gives some indication of arguments for and against their choice. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Either states their choice and gives reasons for and against this choice using relevant points from at least one factor **or** states their choice and gives justification based on relevant points from more than one factor. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Gives at least two relevant points from any factor **or** one relevant point in detail. Answer is not balanced and may be simplistic. 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** **Relevant points include:** **cost factors** • windfarm is more expensive to build • no fuel costs for wind / need to buy gas • wind costs less to run than gas • economic points / employment / resale of energy • efficiency **environmental factors** • wind produces no harmful emissions / waste / greenhouse gases • wind renewable energy source • wind noisy • wind unsightly/large area covered • potential harm to wildlife **steady supply factors** • wind doesn't always blow (at the right speed) / in a windy place • reliability / security of gas supply • one failing wind turbine doesn't affect the others **allow** justification of any choice of energy source including other types of power station (apply reverse arguments as appropriate) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

Question			Answer	Mark	Guidance
4	(a)		2.0	1	if two or more answers circled = 0
	(b)	(i)	0.9	1	
		(ii)	72 000 (2)	2	**if answer is incorrect, look for correct working:** 1 x 60 x1200 (1) **OR** 60 x 1200 (1) **allow** 72 as the answer (1)
			Total	**4**	

Question			Answer	Mark	Guidance
5	(a)		C (1); number of mayfly nymphs in C has decreased (from 135 to 0) / number of mayfly nymphs in rivers A and B has not changed over the years (1)	2	**allow** implication of
	(b)		*any one from:* (more) polluted; (1) description of (increasing) pollution; (1) description of physical change; (1) description of biological change; (1)	1	 **not** less pollution **allow** sewage overflow started / industrial or chemical discharge started / acid rain **allow** change in temperature / change in water level / climate change / global warming **ignore** weather / seasonal changes **allow** change in predators / competition / less food
			Total	**3**	

Question			Answer	Mark	Guidance
6	(a)	(i)	Sun / light (1)	1	
		(ii)	herring / humpback whale (1)	1	
		(iii)	(number of cod will) decrease (1) idea of less food/less herring available for them (to eat) (1)	2	**allow** extinction / die out **allow** idea of competition (between cod and seals) / cod will starve / no food **ignore** less herring alone
	(b)	(i)	2 (2)	2	if answer is incorrect, look for correct working: 140/7000 x 100 (1) **OR** 0.02 as the answer (1)
		(ii)	*any two from:* respiration; (1) heat; (1) movement; (1) excretion / waste products; (1) uneaten parts / decomposition; (1)	2	**ignore** breathing, dying, growth **allow** examples of excretion, including slang terms
			Total	**8**	

Question			Answer	Mark	Guidance
7	(a)			3	all correct = 3 marks 5 correct = 2 marks 4 correct = 1 mark

	Data		Explanation
All living things change over time by natural selection.			✓
The same fossils can be found in different locations on Earth.	✓		
Both plants and animals show variation within a species.	✓		
Different birds have different types of beaks	✓		
Dinosaurs became extinct many years ago.	✓		
Environmental changes can cause species to become extinct.			✓

Question			Answer	Mark	Guidance
	(b)		**(Level 3)** Answer gives a detailed and logically presented description of natural selection, identifying the key stages in a logical order. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Answer gives a partial description of natural selection and identifies some of the key stages. The stages may not be sequenced in a logical order and there may be some errors. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Answer gives some correct features of natural selection but is poorly structured and does not describe the stages in a logical order. 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 for each stage of natural selection include:** **Variation** • all individuals of the same species show variation / are different • some differences are genetic / random mutations can cause genetic differences **Competition & Survival** • a change in conditions / idea of selection pressure, e.g. drought, change in food availability • leads to 'fighting' for food/mate etc / competition idea • best adapted organisms survive / 'survival of the fittest' **Reproduction** • these organisms are more likely to reproduce • passing on the beneficial characteristic/alleles/genes to offspring **allow** these points if made relevant to a specific organism **ignore** references to Lamarck and his ideas (the idea that characteristics change during the lifetime of the organism) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**9**	

Question			Answer	Mark	Guidance
8	(a)	(i)	bacon	1	ring around any other word = 0 marks
		(ii)	none of them	1	ring around any other word = 0 marks
	(b)		2.78……..no (2)	2	this question requires candidates to do a **calculation** and make a **decision** based on the value **allow** any idea that it is not more, e.g. 'less' / 'not more' / 'fewer' **if two marks can't be awarded:** *if decision is no, mark as follows*: 1 + 0.68/2 + 2.88/2… .no (1) 1 + 0.34 + 1.44……..no (1) *if decision is yes, mark as follows*: 2.78…….yes (1) *if the decision is missing:* 2.78…….. (1) *if the calculation is missing:* ……..yes/no (0)

Question			Answer	Mark	Guidance
	(c)	(i)	*any two from:* carry out risk assessments (on food); (1) test food / test premises / hygiene / inspections; (1) advise (on food and health) / educate / inform; (1) posters, ads, leaflets etc, food labelling; (1) legislation / set limits / examples of legislation; (1)	2	**ignore** they reduce salt etc in food / they make food safe **allow** making sure food isn't contaminated / check food is safe **allow** 'tell people about …….'
		(ii)	benefit of flavouring / preservative; (1) idea of benefit outweighs (health) risk (1)	2	**allow** food tastes better / food lasts longer **ignore** ideas of need for salt in diet
			Total	**8**	

Question			Answer	Mark	Guidance
9	(a)		idea of sea / salty water (1) idea of evaporation or drying up (1)	2	**do not allow** idea of extraction (from deposits in the ground) 'salt is left when the sea dries up' = 2 marks
	(b)		**(Level 3)** One feature for each rock fully described and related to origin. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** One feature from each rock fully described but may not be related to the correct rock or statements given about the likely origin of the rocks. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Simple description of appearance of rock A and B. Answer may be simplistic. 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:** • fossil show formed under water / sea • ripples show formed under water / sea • layers show sedimentation • fossils depend on climate/indicates place • fossils allow dating of rock **Indicative scientific points at Level 2 may include:** • fossil in rock A • ripple marks / layers in rock B • you can tell when rock formed / age • looks like formed under water • formed from sediments / grains **Indicative scientific points at Level 1 may include:** • lines • colours • swirls / spiral • shell / creature • smoother **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**8**	

Question			Answer	Mark	Guidance
10	(a)		changing fats to soap ✓ making glass ✓	2	ticks in 3 boxes deduct 1 mark ticks in 4 or 5 boxes = 0 marks
	(b)		*any two from:* acid is corrosive/harmful/becomes less harmful; (1) alkali neutralises acid; (1) to make salt **and** water; (1)	2	**ignore** makes road safer / less slippy / acid dangerous **allow** products are safe / acid becomes safer **allow** becomes neutral / safe pH / alkali reacts with acid **allow** salt water **allow** correct word equation for 2 marks
			Total	**4**	

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