OCR
RECOGNISING ACHIEVEMENT

GCSE

Science A

General Certificate of Secondary Education

Unit **A213/02:** Unit 3: Modules B3, C3, P3 (Higher Tier)

Mark Scheme for January 2011

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.

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Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.

2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.

3. Accept any clear, unambiguous response which is correct, eg mis-spellings if phonetically correct (but check additional guidance).

4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/	=	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
<u>words</u>	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW/owtte	=	alternative wording
ORA	=	or reverse argument

eg mark scheme shows 'work done in <u>lifting</u>/(change in) <u>gravitational</u> potential energy' (1)
"work done" = 0 marks
"work done lifting" = 1 mark
"change in potential energy" = 0 marks
"gravitational potential energy" = 1 mark

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

6. 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.

   The example below illustrates how to apply this principle to an objective question.

   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 zero marks.	*This would be worth one mark.*	*This would be worth one mark.*

7. 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.

8. 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**

Question			Expected Answers	Marks	Additional Guidance
1	(a)		[ ] → B → A → C → E	[2]	D not used. If at least 3 boxes have been completed (1). A immediately before C (1). Allow marks for correct answers if words from sentences used rather than letters. Eg 'turns turbine' = A
	(b)		All the carbon in plants... ☑ (1) ☐ All the carbon dioxide given off... ☑ (1) ☐ ☐	[2]	One mark for each correct answer. If 3 ticks are given, deduct 1 mark. 4 or 5 ticks = 0 marks
			Total	[4]	

Question			Expected Answers	Marks	Additional Guidance
2	(a)		...light grey. (1) ☑ ☐ ☐	[1]	
	(b)		☐ ... less penetrating ... (1) ☑ ☐ ☐	[1]	
	(c)		**Any 3 but no more than 2 from either list:** • **Comparison of Risk** gamma more penetrating than X rays; gamma higher energy/higher frequency/shorter wavelength/more ionising; gamma cause more damage/harm to (eg body); idea that gamma cannot be turned off • **Situation** gamma rays can be used in a confined space/example of gamma rays being used in a small space; gamma can be used where there is no electricity; gamma needed to destroy cancer/kill microbes/specific use which needs greater penetration eg thickness testing	[3]	**Allow** reverse argument in each case. **Allow** examples of greater penetration of gamma. **Ignore** higher on the scale/more powerful. **Ignore** X rays are not ionising. **Ignore** more damaging/harmful alone. **Ignore** gamma rays are portable alone. **Ignore** X rays need electricity alone. **Allow** uses eg sterilisation of equipment.
			Total	[5]	

Question			Expected Answers	Marks	Additional Guidance
3	(a)		answer between 2360-2385	[1]	
	(b)		15/15.4/15.42/15.417/15.416667	[2]	**2 marks for correct answer.** **Ignore** any working shown. **If any other answer (or no answer) is given, award 1 mark <u>max</u> for:** '370' <u>and</u> '100' shown anywhere in the working **OR** Any answer between 15.041 and 15.792.
	(c)		☐ The perceived risk... ☑ (1) ☐ ☐ Even thought the chance of... ☑ (1)	[2]	One mark for each correct answer. If 3 ticks are given, deduct 1 mark. 4 or 5 ticks = 0 marks
			Total	[5]	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		**Any two from:** • falls (from 1963 to 2001)/overall downward trend/ • rises until 1970/275000 tonnes fish/rise then fall; • falls from 1971 (to 2001); • small rise around 1981/ small rise around 1974/ small rise around 1997/ fluctuates/goes up and down; • falls below the minimum population advised by scientists;	[2]	**Allow** + or – 1 year/+ or – 10000 tonnes **Ignore** ref to other years.
	(b)		biodiversity (1): prevent extinction/prevent dying out/reduction in numbers of species food webs (1): effect on other species resources (1): idea of maintaining such things as food, medicines, fibres, energy sources, ores, supply of materials	[3]	Ignore 'damage to food chain/web'. Allow recycling to preserve resources. Ignore maintaining resources/resources will run out.
	(c)	(i)	Charles (1)	[1]	
		(ii)	genes/chromosomes/DNA and inherited/passed on (1)	[1]	**Both** correct for one mark.

Question			Expected Answers	Marks	Additional Guidance
	(d)		☐ ☐ ☐ The data reduces confidence... ✓ (1) The data is insufficient... ✓ (1)	[2]	One mark for each correct answer. If 3 ticks are given, deduct 1 mark. 4 or 5 ticks = 0 marks
			Total	[9]	

Question			Expected Answers	Marks	Additional Guidance
5	(a)		Africa (1)	[1]	
	(b)		7 individuals (1)	[1]	**Allow** small sample.
	(c)		(common) ancestor (1) extinct (1) different (1)	[3]	**Ignore** genetic background, common gene. **Not** dead
			Total	[5]	

Question			Expected Answers	Marks	Additional Guidance
6	(a)		Barry (1)	[1]	
	(b)		Donna (1)	[1]	
	(c)		Flora (1)	[1]	
			Total	[3]	

Question			Expected Answers	Marks	Additional Guidance
7	(a)	(i)	D (1)	[1]	
		(ii)	A and C (1)	[1]	**Both** answers in either order for one mark.
		(iii)	bacteria (1)	[1]	**Accept** any indication of correct answer eg underlining.
		(iv)	☐ nitrogen in the air → nitrates in soil ☑ (1) ☐ ☐	[1]	
	(b)		**Any three from:** • plants/algae (in water) grow well (on fertiliser); • plants die due to lack of light/competition for nutrients; • (dead plants) decay/decomposed (by bacteria); • bacteria/decay use oxygen; • Effect on animals in the water due to river choked by plants/lack of oxygen; • idea of contamination of drinking/our water	[3]	**Ignore '**plants grow' alone. **Accept** fertilisers cause growth. **Ignore** air. **Allow** unsafe for humans/animals or harm caused to animals etc from drinking the water. **Ignore** poisons fish/contaminates the water.
			Total	[7]	

Question			Expected Answers	Marks	Additional Guidance
8	(a)		the change of diabetes... ☐ the change of diabetes... ✓ ☐ ☐ how much more likely... ✓	[1]	**Both** ticks for one mark.
	(b)		type 1 controlled by insulin (injections) (1) type 2 controlled by diet/exercise (1)	[2]	**Allow** reduction in sugary foods.
	(c)		...is quickly absorbed... ☐ ☐ ...a rapid rise... ☐ ☐ ☐ ... returns very slowly ... ☐ ☐ ☐	[1]	**Both** lines correct and no others drawn in for one mark.
			Total	[4]	

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