

Additional Science A

General Certificate of Secondary Education

Unit **A217/02**: Modules B6, C6, P6 (Higher Tier)

Mark Scheme for January 2013

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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
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response

	no benefit of doubt
	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

Subject-specific Marking Instructions

- Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- 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 and 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	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

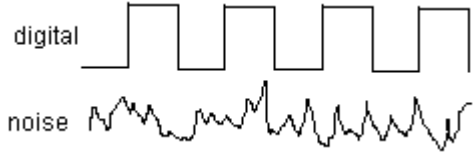
- e. For answers marked by levels of response:
- i. **Read through the whole answer from start to finish**
 - ii. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
 - iii. **To determine the mark within the level**, consider the following:

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)	modulated	1	
	(b)	any three of the following, [1] each: quality of (radio) signal is lost because of noise; the noise can be separated from a digital signal; in a (digital) receiver / before it is amplified; (but) not in an analogue/non-digital receiver; digital signal is pulses / on and off / 1 or 0 / binary / high or low /; noise is random signal / interference is signal from other sources;	3	<p>accept interference for noise</p> <p>accept filtered or cleaned for separated</p> <p>reject sound as signal</p> <p>accept diagrams instead of descriptions</p>  <p>The diagram consists of two horizontal lines representing time. The top line is labeled 'digital' and shows a square wave with four distinct pulses. The bottom line is labeled 'noise' and shows a jagged, irregular waveform that fluctuates rapidly across the time axis.</p>
Total			4	

Question		Answer	Marks	Guidance
2	(a)		2	correct pattern = 2 marks one or two mistakes = 1 mark
	(b)	any two of the following, (1) each speed decreases; wavelength decreases; frequency remains unchanged;	2	no ecf from incorrect speed change all marking points are independent accept two correct statements with a third incorrect for [2] reject wavefront for wavelength
	(c)		1	all three correct = 1 mark accept visible or light on its own ignore TV accept γ instead of gamma
Total			5	

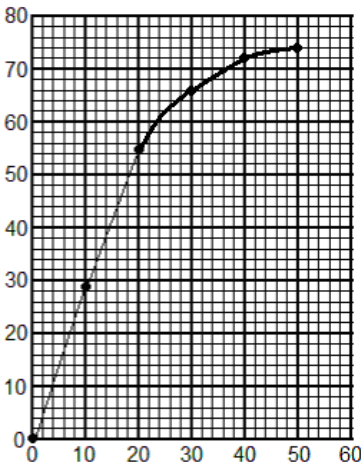
Question		Answer	Marks	Guidance
3	(a)	frequencies / wavelengths / photon energies	1	
	(b)	diffraction	1	
	(c)	CBAE	3	starts with C for (1) ends with E for (1) second and third B then A for (1) remember clever birds analyze eggs
Total			5	

Question		Answer	Marks	Guidance
4	(a)	retrieval storage	1	both required for 1 mark
	(b)	billions experience transmit	2	all three correct = 2 marks two or one correct = 1 mark
	(c)	<p>The variety of potential pathways...</p> <div style="display: flex; align-items: center; gap: 10px;"> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> </div>	1	
Total			4	

Question		Answer	Marks	Guidance								
5	(a)	<p>any three of the following, [1] each</p> <p>(chemical/transmitter) moves by diffusion; across gap / through synapse / from A to B; (where it) binds to receptors; on the membrane (of B); receptors bind to specific chemicals/transmitters only;</p>	3	<p>ignore motor / sensory neuron, named neurotransmitter</p> <p>accept sticks to / reacts with instead of binds to</p> <p>accept surface / edge (of B)</p>								
	(b)	<table border="0"> <tr> <td>increases ...</td> <td>reduces</td> </tr> <tr> <td>reduces ...</td> <td>increases in synapse</td> </tr> <tr> <td>reduces removal</td> <td>reduces</td> </tr> <tr> <td>increases ...</td> <td>increases</td> </tr> </table>	increases ...	reduces	reduces ...	increases in synapse	reduces removal	reduces	increases ...	increases	2	<p>one mark for LHS</p> <p>one mark for RHS</p>
increases ...	reduces											
reduces ...	increases in synapse											
reduces removal	reduces											
increases ...	increases											
Total			5									

Question		Answer	Marks	Guidance
6	(a)	Bradley (1)	1	
	(b)	any two from: language / talking / understanding speech / consciousness / thinking / intelligence / processing information / owttte (1)	2	apply list principle not personality / owtte not memory, learning
	(c)	electrical stimulation (of the brain) / electric encephalogram / EEG (scan) / functional magnetic resonance imaging fMRI / MRI / positron electron tomography PET (scan) / radioactive (tracer) / studies of patients with traumatic brain damage (1)	1	not CAT scans / X-rays / brain scans / ECG / dissection / electrocution accept (small) electric shocks not Alzheimer's, disease, decay etc
	(d)	description of any of these techniques : association with a stimulus eg sound, colour, smell, past event; repetition; chunking; mnemonic / story / rhyme; clear explanation of how a technique works eg strengthening neural pathways, involvement of many different brain areas, limiting working space memory between 5 and 9 ...	1	accept selecting a password which is easy to remember ignore patterns as a technique
Total			5	

Question		Answer	Marks	Guidance					
7	(a)	$\square + 2\text{HCl} \rightarrow \square + \text{H}_2\text{O} + \text{CO}_2$	2	correct reactants and products [1] then correct balancing [1] look for correct use of capitals and subscripts					
	(b)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="padding: 2px 10px;">A</td><td style="padding: 2px 10px;">F</td><td style="padding: 2px 10px;">D</td><td style="padding: 2px 10px;">B</td><td style="padding: 2px 10px;">E</td></tr></table>	A	F	D	B	E	2	A and E correct for [1] FDB correct for [1]
A	F	D	B	E					
	(c)	63	1						
Total			5						

Question		Answer	Marks	Guidance
8	(a)	any three from: increase concentration (of hydrochloric acid); raise temperature decrease particle size / increased SA of particles; add catalyst; stir / agitate / mix;	2	three correct = 2 two correct = 1 ignore more acid / more carbonate accept stronger acid = increase concentration of acid accept heat / warm up = raise temperature
	(b) (i)		2	points plotted within one square = 1 mark clear attempt to join points with a smooth curve = 1 mark ignore extended curve beyond final plot allow ecf from incorrectly plotted points for the correct curve = 1 mark max

Question		Answer	Marks	Guidance
	(ii)	any one from: (acid) concentration falls; less copper carbonate; fewer particles (to react);	1	ignore gas / CO ₂ runs out / used up ignore runs out of energy ignore less acid accept less (copper) carbonate/particles to react with reject one or both reactants (completely) used up
Total			5	

Question		Answer	Marks	Guidance								
9	(a)	ethanoic acid citric acid hydrogen chloride sulphuric acid	1									
	(b)	magnesium chloride MgCl ₂	2	capitals and lower case must be correct accept poor subscripts so long as the top of the number comes clearly below the top of the preceding letter								
	(c)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 80%;">magnesium chloride</td> <td style="width: 20%;"></td> </tr> <tr> <td>magnesium sulfate</td> <td></td> </tr> <tr> <td>magnesium oxide</td> <td style="text-align: center;">✓</td> </tr> <tr> <td>magnesium nitrate</td> <td></td> </tr> </tbody> </table>	magnesium chloride		magnesium sulfate		magnesium oxide	✓	magnesium nitrate		1	
magnesium chloride												
magnesium sulfate												
magnesium oxide	✓											
magnesium nitrate												
Total			4									

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