

Additional Science A

General Certificate of Secondary Education

Unit **A218/01**: Ideas in Context (Foundation 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
<u>words</u>	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:

Annotation	Meaning
	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

Annotation	Meaning
	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.

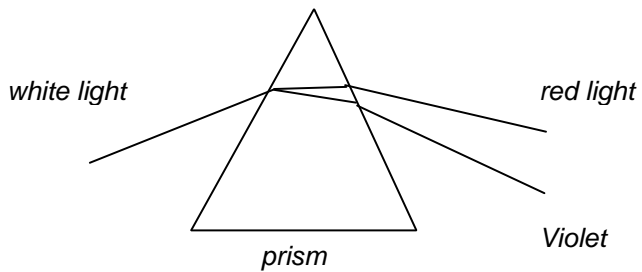
Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- 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)	(i)	breathing; sweating	2																					
		(ii)	(maintenance of a) constant / steady / unchanging; internal environment / body / inside conditions;	2	accept control / regulation (of internal environment) reject balance accept example e.g. body temperature, blood salt, blood urea, blood sugar ... ignore water levels																				
		(iii) more concentrated.	1																					
	(b)		<table border="1"> <thead> <tr> <th></th> <th>always increases</th> <th>always decreases</th> <th>stays the same or decreases</th> <th>stays the same</th> </tr> </thead> <tbody> <tr> <td>sugar</td> <td></td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>urea</td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>salt</td> <td></td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>		always increases	always decreases	stays the same or decreases	stays the same	sugar				✓	urea		✓			salt			✓		2	3 correct for 2 marks 2 correct = 1 mark 1 or 0 correct = 0 marks
	always increases	always decreases	stays the same or decreases	stays the same																					
sugar				✓																					
urea		✓																							
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	(c)		<table border="1"> <tbody> <tr> <td>.... become too hot.</td> <td></td> </tr> <tr> <td>.... become dehydrated.</td> <td>✓</td> </tr> <tr> <td>.... have too much water in their blood.</td> <td></td> </tr> <tr> <td>.... produce a smaller volume of less dilute urine.</td> <td></td> </tr> <tr> <td>.... produce a greater volume of more dilute urine.</td> <td>✓</td> </tr> </tbody> </table> become too hot.	 become dehydrated.	✓ have too much water in their blood.	 produce a smaller volume of less dilute urine.	 produce a greater volume of more dilute urine.	✓	2											
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.... produce a greater volume of more dilute urine.	✓																								

Question		Answer	Marks	Guidance
1	(d)	$(5000 \div 60000000) \times 100 =;$ 0.008(3) (%)	2	correct answer on its own for [2] correct method for calculating a percentage, (perhaps with 60, 60 000 or 60 000 000 000) for [1]
	(e)	(passive overall) movement of molecules/particles; (from a region of their) high concentration to (a region of their) low concentration; 1 mark for QWC	2 1	accept urea, salt, sugar as particles ignore references to partially permeable membrane ignore concentration gradient QWC = correct spelling of non-technical terms of two or fewer syllables for a response which engages with the question
Total			14	

Question		Answer	Marks	Guidance												
2	(a)	any two from: wavelength frequency photon / particle energy / packet energy	2	allow (different) refraction accept energy												
	(b)	(i) <table border="1"> <thead> <tr> <th>Property</th> <th>Particles (Newton)</th> <th>Waves (Huygen)</th> </tr> </thead> <tbody> <tr> <td>reflection</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>refraction</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>interference</td> <td>(x)</td> <td>✓</td> </tr> </tbody> </table>	Property	Particles (Newton)	Waves (Huygen)	reflection	✓	✓	refraction	✓	✓	interference	(x)	✓	2	1 mark for each correct column
Property	Particles (Newton)	Waves (Huygen)														
reflection	✓	✓														
refraction	✓	✓														
interference	(x)	✓														
		(ii) <table border="1"> <tbody> <tr> <td>a wave of light</td> <td></td> </tr> <tr> <td>a packet of energy</td> <td>✓</td> </tr> <tr> <td>a ray of light</td> <td></td> </tr> <tr> <td>the energy of the wave</td> <td></td> </tr> </tbody> </table>	a wave of light		a packet of energy	✓	a ray of light		the energy of the wave		1					
a wave of light																
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	(c)	(i) speed = wavelength x frequency = $300 \times 1,000,000$ OR speed = $300,000,000 (= 3 \times 10^8)$	2	correct method and substitution for [1] $300\,000 \text{ km/s}$ for [1]												
		(ii) $300,000,000 \text{ m/s}$	1	ecf answer from (i) accept 'the same as the radio wave' $300\,000 \text{ km/s}$ for [1]												
		(iii) infrared/(visible) light/ultraviolet/gamma/microwaves	1	accept uv and ir, terahertz, red, green, blue, visible ignore radio waves / X-rays												

Question			Answer	Marks	Guidance
2	(d)	(i)	<p>at least one ray refracting correctly entering and leaving the prism (1)</p> <p>colours of spectrum in correct order i.e. red, orange, yellow, green, blue, indigo, violet - at least two (1)</p> 	2	<p>accept straight lines drawn with out a rule</p> <p>accept a vertical list</p>
		(ii)	<p>both slow down (1)</p> <p>violet light slows down more than red light = 2 marks</p>	2	<p>ecf from diagram</p> <p>reject refracts as change of speed</p>
Total				13	

Question			Answer	Marks	Guidance
3	(a)	(i)	H ₂ SO ₄	1	
		(ii)	carbon dioxide; water	2	ignore hydrogen oxide
		(iii)	<u>44</u> %	1	
	(b)	(i)	4	1	
		(ii)	more mass lost/it increases/quotes number > 0.15 g	1	accept increased rate of reaction
	(c)		zinc; phosphoric (acid); magnesium nitrate	3	
	(d)	(i)	any two from: add (magnesium carbonate) to (dilute) <u>sulfuric</u> acid; add too much / add excess (magnesium carbonate) idea; filter idea;	2	
		(ii)	any two from: evaporate; to remove some water; leave to crystallise; dry the crystals in a dessicator or oven;	2	accept heat / boil not to dryness / all water accept dry on filter paper
Total				13	

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