

Additional Applied Science A

General Certificate of Secondary Education

Unit **A336/02**: Materials and Performance (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

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	alternative wording
ORA	or reverse argument
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

Annotation	Meaning
	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

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

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.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

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, 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.
- d. 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 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

Question		Answer	Marks	Guidance
1	(a)	<p>...half the average loudness.</p> <p>...twice the average loudness.</p> <p>...five times the average loudness.</p> <p>...ten times the average loudness.</p>	1	
	(b)	material which can absorb energy of vibrations; placed between equipment and source of vibration;	2	accept springs, rubber, damper reject wrap up equipment
Total			3	

Question		Answer	Marks	Guidance
2	(a) (i)	elastic;	1	allow elasticated, elastically, elasticity reject flexible
	(ii)	plastic;	1	allow plastically reject non-elastic or inelastic
	(b) (i)	150 (N);	1	allow 145–155 (N)
	(ii)	1.2(%);	1	allow 1.1% to 1.3% allow ecf from 6bi
	(iii)	(yes) because (cloth) returns to its original shape up to 1.2% (stretch) / 1% is less than 1.2% / graph shows a straight line up to 1.2%	1	allow ecf from bii and bi only if all three parts are consistent and either: (yes) ecf values >150N, >1.2% reason as expected or: (no) because only returns to original shape up to ecf value / (no) because 1% is more then ecf value
Total			5	

Question		Answer	Marks	Guidance
3	(a)	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;">...the same as a pure metal.</div> <p>An alloy is... ———</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;">...a solid solution of elements in a metal.</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;">...a complimentary material.</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;">...a composite material.</div>	1	
	(b)	hardness; less easily scratched / blunted OR stiffness; doesn't bend when used;	2	
	(c)	make it thicker / design shape carefully / use a different alloy	1	
	(d) (i)	how experiment is set up by text or diagram; how temperature change is measured; how expansion is measured;	3	
Total			7	

Question		Answer	Marks	Guidance
4	(a) (i)	stronger, more ductile; can be drawn out owtte;	1	both required for 1 mark reject rusting
	(ii)	strong: can withstand rolling in to thin sheets and being rammed through the tungsten carbide ring ductile: can be stretched in to a thin sheet and then can shape	2	
Total			3	

Question		Answer	Marks	Guidance														
5	(a)	in text or diagram: potential difference across cable ; ammeter in series with cable; voltmeter in parallel with cable;	3	if multimeter used: in series with cable to measure current (1) in parallel with cable to measure voltage (1) OR in parallel with cable to measure resistance (1) conductance is inverse of resistance (1)														
	(b) (i)	pair of I, V, values from graph; correct substitution and evaluation to 0.16S; OR attempt to calculate gradient of graph; correct evaluation of gradient to 0.16 S;	2	allow 1 mark ecf for correct substitution and evaluation using a pair of I,V values from graph for aluminium 0.16 S gets 1 mark pairs of data points: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Voltage (V)</th> <th>Current (A)</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td>0.08</td> </tr> <tr> <td>1.0</td> <td>0.16</td> </tr> <tr> <td>1.5</td> <td>0.24</td> </tr> <tr> <td>2.0</td> <td>0.32</td> </tr> <tr> <td>2.5</td> <td>0.40</td> </tr> <tr> <td>3.0</td> <td>0.48</td> </tr> </tbody> </table> For V allow ± 0.1 , for A allow ± 0.02	Voltage (V)	Current (A)	0.5	0.08	1.0	0.16	1.5	0.24	2.0	0.32	2.5	0.40	3.0	0.48
Voltage (V)	Current (A)																	
0.5	0.08																	
1.0	0.16																	
1.5	0.24																	
2.0	0.32																	
2.5	0.40																	
3.0	0.48																	
	(ii)	higher conductance AND conductance varies/nonlinear;	1	accept better conductor														
	(c) (i)	material and purpose no mark property 1; property 2;	2	purpose and materials must be given for any marks to be credited														
	(ii)	situation no mark material 1 with required property 1; material 2 with required property 2;	2	situation must be given for any marks to be credited														
Total			10															

Question		Answer	Marks	Guidance
6	(a)	refractive index	1	allow refraction
	(b)	(i) different values of refractive index; higher refractive index increases the power;	2	
		(ii) gas permeable, to allow oxygen to the cornea; easily sterilised, to prevent eye infection; stick to tears, so stay in place on eye;	3	accept other suggestions with valid reasons
	(c)	(i) becomes larger	1	
		(ii) lens becomes thicker	1	
		Total	8	
		Paper Total	36	

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