

Additional Applied Science A

General Certificate of Secondary Education

Unit **A336/01**: Materials and Performance (Foundation Tier)

Mark Scheme for June 2012

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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	alternative wording
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

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

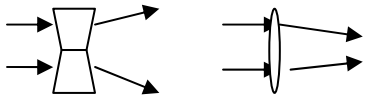
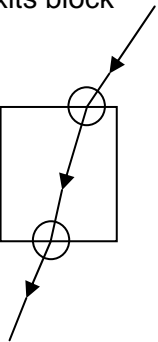
the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

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

Question			Answer	Mark	Guidance
1	(a)	(i)	safe/ fit for purpose / same as other similar ladders	1	allow reference to quality or met a certain standard/British standard accept 'good quality ladder' but not just 'good ladder' ignore 'it has been tested', or 'it will not break' 'approved' alone is insufficient
		(ii)	CE / ISO/FSA/European standards	1	not BSI or British Standards Institute
	(b)	(i)	any job which involves inspecting a tangible product	1	accept suitable job eg food/health/safety inspector officer = inspector must be a job NOT an agency not trading/product standards inspector /policeman /teacher /toy inspector/ofsted
		(ii)	a job which requires understanding of materials; a relevant material property	2	accept any job that requires a knowledge of a material eg electrician, electrical properties of wire (2); mechanical engineer, a relevant mechanical property eg strength (2); Carpenter, so uses wood that does not split/splinter (2); painter, ability of a paint to bond to a certain surface (2) properties can include cost/ aesthetic appearance/durability/ environmental impact not 'knowing the best materials to use' so 'a builder must know that a brick is strong' gets 2 marks but 'a builder must know the best material for a job' only gets the first mark
	(c)	(i)	density/less dense / light(er) (1) toughness/tough(er) / won't snap or crack (1)	2	
		(ii)	stiffness (1); (less stiff so) bends more when used (1); OR strength (1); (weaker so) breaks more easily (1) ; OR hardness (1); (less hard so) gets damaged more easily (1)	2	ORA but needs to reverse reasons

Question		Answer	Mark	Guidance									
	(d)	object with reason for needing safety margin	1	accept normal limit with indication that object functions safely beyond this limit answer must show that product will operate beyond the limits expected eg lift can hold more people than designed for (1) but holds more weight (0) as just implies it is strong accept 'to allow for extra load' accept tunnel – stronger than needed but not just 'strong' accept food and reference to sell by date (or similar) reject ladder									
2	(a)	<p style="text-align: center;">sample</p> <p>gold <input checked="" type="checkbox"/></p> <p>wood <input type="checkbox"/></p> <p>glass <input type="checkbox"/></p> <p>paper <input type="checkbox"/></p> <p>copper <input checked="" type="checkbox"/></p>	2										
	(b)	ductile; shiny	2										
	(c)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Material</th> <th>good</th> <th>bad</th> </tr> </thead> <tbody> <tr> <td>polystyrene</td> <td></td> <td>✓</td> </tr> <tr> <td>tin</td> <td>✓</td> <td></td> </tr> </tbody> </table>	Material	good	bad	polystyrene		✓	tin	✓		1	both must be correct for one mark
Material	good	bad											
polystyrene		✓											
tin	✓												

Question		Answer		Mark	Guidance										
	(d)		<table border="1"> <thead> <tr> <th>class of material</th> <th>example</th> </tr> </thead> <tbody> <tr> <td>wood</td> <td>pine</td> </tr> <tr> <td>metal</td> <td>iron</td> </tr> <tr> <td>polymer</td> <td>polythene</td> </tr> <tr> <td>ceramic</td> <td>brick</td> </tr> </tbody> </table>	class of material	example	wood	pine	metal	iron	polymer	polythene	ceramic	brick	3	4 correct gets 3 marks 2 or 3 correct gets 2 marks 1 correct gets 1 mark
class of material	example														
wood	pine														
metal	iron														
polymer	polythene														
ceramic	brick														
3	(a)	(i)	reflective	1											
		(ii)	any valid example which includes the purpose for using the mirror	1	reject responses with no reference to purpose eg accept 'to see something'/'to make room look bigger' reject if location only is given eg 'in the bathroom' (only) or 'in a microscope'										
	(b)		valid use of a named specialised glass (1); special property/reason appropriate to stated use (1)	2	accept in reverse order, eg eg toughened glass in windows or doors (1) so people don't fall through windows/ are not cut by broken glass (1); OR photochromic glass in spectacles (1); to adjust light intensity (1) OR stained glass in churches (1); for aesthetic reasons (1) etc OR self cleaning glass in tall buildings/inaccessible places (2); this is a special case where the first part of the answer can gain both marks other possible specialised glass: tinted, bulletproof, frosted, translucent, laminated reject double glazing one way glass and shatterproof glass can get property mark only mismatch of property or omission of name/use gets 1 mark only, eg 'car windscreen so people aren't injured' gets 1 mark										

Question	Answer	Mark	Guidance								
(c) (i)	rays pointing towards each other; rays pointing away from each other 	2	rays must be 'nearly' continuous from those on diagram (need not be inside the lens) arrows on RHS not necessary but if drawn must be to right. rays must be straight by eye if poorly drawn then 1 mark only								
	(ii) X where ray enters/exits block 	1	only 1 correct circle required, if 2 drawn then both must be correct								
4 (a)	<table border="1"> <tr> <td>improved properties</td> <td></td> </tr> <tr> <td>one embedded in another</td> <td>✓</td> </tr> <tr> <td>dissolved</td> <td></td> </tr> <tr> <td>different</td> <td></td> </tr> </table>	improved properties		one embedded in another	✓	dissolved		different		1	
improved properties											
one embedded in another	✓										
dissolved											
different											
(b)	valid use of a named composite material; (1) two or more named materials which form the composite (1)	2	do not accept cement but allow concrete allow recognized initials eg GRP mismatch of use and materials loses 1 mark								
(c) (i)	solid solution	1	allow one metal dissolved in another metal allow mixture/combination of two or more metals; reject named alloy								

Question		Answer	Mark	Guidance
		(ii) to ensure alloy is made the same way every time/ to ensure quality or consistency or reliability (of mechanical properties)	1	allow for safety
		(iii) strong(er)/hard(er)/tough(er)	1	ignore lighter or flexible or cheaper
5	(a)	(i) plastic	1	reject non elastic or permanent deformation allow plasticity
		(ii) elastic	1	allow elasticity
	(b)	(i) expect 70N; accept values between 68 and 75 N	1	
		(ii) 60/(30x4); (1) 0.5 (mm) (1)	2	raw 0.5 gets 2 marks
		Paper Total	36	

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