

Additional Applied Science A

General Certificate of Secondary Education

Unit **A336/02**: Materials and Performance (Higher 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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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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 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)	improved properties	1		
		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	
	(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	
2	(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); 0.5 (mm)	2	allow ecf	

Question			Answer	Mark	Guidance
3	(a)	(i)	dioptries	1	allow D
		(ii)	ECBAD	2	E before A for 1 mark
	(b)	(i)	inverted; real	2	
		(ii)	(becomes) thicker; (1) increases in size (1)	2	not widens/expands
	(c)		BCA	1	
	(d)		impurities absorb/reflect/disperse light (1) good transmission/strong signal/for transparency (1)	2	
	(e)		any three from: gas permeable – to allow oxygen/gas to the cornea/eye; easily sterilised – to prevent eye infection; stick to tears – so stay in place on eye; soft – for comfort / reduce irritation; hard – so don't scratch easily; durable – so they do not have to be replaced too often	3	accept other valid reasons allow comments that evidently relate specifically to hard or soft contact lenses reject transparent reject soft – so do not scratch/damage the eye
4	(a)		increases time (for collision); force decreases	2	
			material and use; (1) two relevant properties (1)	2	must refer to two subsequent properties must relate to the material and use stated
	(c)	(i)	substitute and rearrange (1) 150000N (1)	2	evidence of $\Delta v = 15$ for 1 mark
		(ii)	(change) in momentum is less owtte	1	

Question			Answer	Mark	Guidance
5	(a)	(i)	diagram of method which demonstrates thermal expansion, with heat source	1	
		(ii)	named control variable: length/ thickness/ temperature/rise/a relevant dimension	1	reject heat for same length of time
		(iii)	quantitative method to measure expansion; method of measuring small expansion	1	eg rotating pin and straw/ vernier calliper/ projected shadow reject ruler
	(b)		name/description of system and materials; (1) effect of heating (1)	2	eg thermometer with glass + alcohol or mercury, bimetal strip with two named metals could be shown by diagram
			Total	36	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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