

# **Additional Applied Science A**

General Certificate of Secondary Education

Unit **A336/02**: Materials and Performance (Higher Tier)

## **Mark Scheme for June 2011**

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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.

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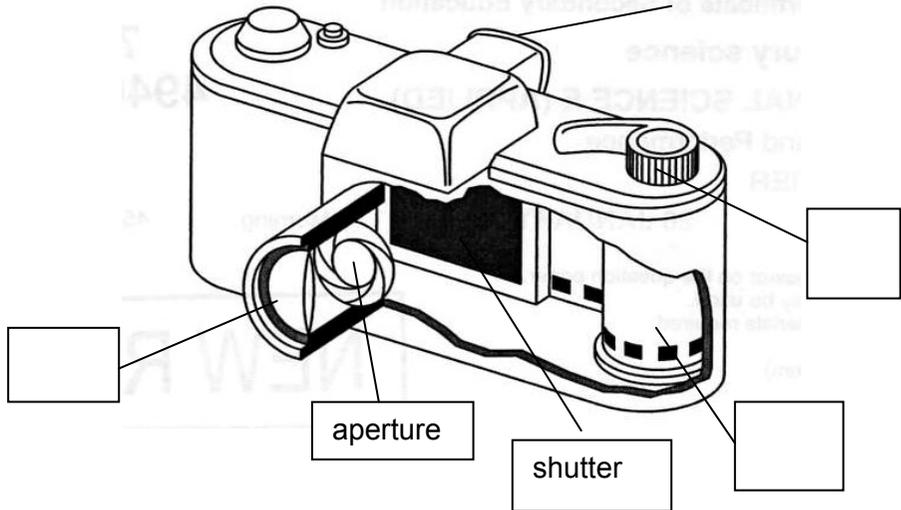
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Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	=	alternative and acceptable answers for the same marking point
<b>(1)</b>	=	separates marking points
<b>not</b>	=	answers which are not worthy of credit
<b>reject</b>	=	answers which are not worthy of credit
<b>ignore</b>	=	statements which are irrelevant
<b>allow</b>	=	answers that can be accepted
( )	=	words which are not essential to gain credit
<u>   </u>	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

Question			Expected Answers	Marks	Additional Guidance
1	a	i		2	subtract 1 mark for each multiple answer eg two boxes containing the word 'shutter'
	a	ii	so more light passes through / to reduce reflection;	1	<b>allow</b> bright(er)/clear(er) image <b>allow</b> 'reduce glare'
	b	i	refraction	1	
	b	ii	diopetre(s)	1	<b>allow</b> D but reject 'd'

Question		Expected Answers	Marks	Additional Guidance
	c	focal length-the <b>distance</b> from the (centre of the) <u>lens</u> to the image  focal plane – the plane/ vertical line where the image is made / vertical line drawn through image and labelled	1  1	<b>allow</b> distance from lens to where you put the film/CCD <b>allow</b> distance from lens to focal point/plane <b>allow</b> distance from lens to where the rays cross. <b>allow</b> distance to be shown on the diagram BUT must be parallel to axis if diagram contradicts the explanation then zero  <b>allow</b> idea of position to get the best image eg where the image is sharp/where the rays meet, <b>allow</b> where the film/CCD is, <b>reject</b> responses which are ambiguous and may not refer to image position eg 'where you focus it' if diagram contradicts the explanation then zero
		<b>Total</b>	<b>7</b>	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	3	1	
	a	ii	<p>if YES idea of test being repeated; results/graphs are similar</p> <p>if NO not enough repeats/need more repeats; results/graphs are different</p>	2	<p>no marks for just yes or no <b>ignore</b> incorrect number of repeats 'both' implies repeats eg both results/graphs are similar = 2</p> <p><b>allow</b> should be done three times</p>
	b		<p>method of applying force; method of measuring deflection ; change force/change sample</p>	3	<p>zero for impact tests eg hitting, dropping etc <b>accept</b> using a ruler to measure deflection zero for 'Test them all' unless the test is described</p>
			<b>Total</b>	<b>6</b>	

Question			Expected Answers	Marks	Additional Guidance
3	a	i	decibel	1	<b>reject</b> dB
	a	ii	twice as loud	1	
	b		valid material for reducing sound; reflects/absorbs as appropriate to material	2	<b>allow</b> objects that are used because of their material, eg acoustic tiles/ carpet tiles; to absorb sound energy <b>allow</b> second mark only for a response which would not reduce sound intensity but which does give correct behaviour, eg 'ceramic tiles to reflect sound energy' gets one mark <b>reject</b> answers based on sound generated outside the room, eg close the door/window <b>reject</b> ear defenders
	c		material or equipment used;  absorbs the vibration/ the location between machinery and structure of building	2	springs, dampers, rubber; <b>reject</b> foam unless qualified eg foam rubber <b>reject</b> non-specific example such as cushioning or padding  <b>reject</b> wrapping up the equipment <b>reject</b> arguments about sound
			<b>Total</b>	<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
4	a	name two parts;  explain why parts should expand at the same rate	2	<b>accept</b> any feasible arrangement even if not used in practice <b>reject</b> answers relating to accommodating expansion  <b>reject</b> 'does not fit' or 'breaks' without further detail
	b	i	2	<b>accept</b> values in range 0.17-0.19 (N/mm <sup>2</sup> /°C) <b>allow ecf</b> from incorrect change of tensile strength <b>ignore</b> + or - signs
	b	ii	1	
	b	iii	1	<b>reject</b> cost, strength, appearance <b>accept</b> colour, durability
<b>Total</b>			<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
5	a	named material and how it is used; two relevant properties two reasons for needing these properties	3	if no use is given then 0 marks <b>allow</b> 1 mark for each property and reason it is needed; both properties must relate to the same material
	b	name of object and two parts/materials; two relevant mechanical properties; reasons for needing these properties	3	needs to follow bulletpoints if no object is given then zero marks if only one material then zero marks
	c	change of momentum linked to force; (because) inner layer increases time for collision; force (of collision) is reduced	3	<b>reject</b> 'cushions impact'; 'slowing down the impact' as meaning longer time
	d	$60 \times 5 (= 300)$ ; $300 / 3 = 100 \text{ (N)}$	2	allow 1 for rearranging correctly to $F=$ using words, symbols, numbers or mixture <b>ignore</b> + or - signs
		<b>Total</b>	<b>11</b>	
		<b>Paper Total</b>	<b>36</b>	

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