

Additional Applied Science A

General Certificate of Secondary Education **A336/01**

Unit 6: Materials and Performance (Foundation Tier)

Mark Scheme for June 2010

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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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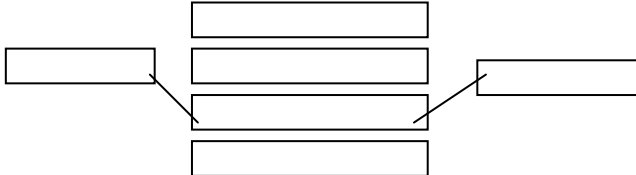
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Question		Expected Answer	Mark	Rationale/Additional Guidance
1	a		[4]	<p>ignore any line from good thermal conductance.</p> <p>If 2 lines come from the RH side of any box then do not give this mark eg From 'pins on plug box' lines to both rigid and brittle will not gain the mark – candidates can still gain other marks</p>
	b	tension (1); compression (1);	[2]	beware if answers wrong way round
	c	translucent	[1]	allow if circled
		Total	[7]	
2	a	tough, self-cleaning	[2]	
	b	example of appropriate use (1) appropriate property of glass(1)	[2]	use and property can be transposed
		Total	[4]	

Question		Expected Answer	Mark	Rationale/Additional Guidance
3	a	appropriate job (1); knowledge of <u>relevant</u> material property (1);	[2]	allow any job that requires a knowledge of a material e.g. 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
	b	i		
		so works can use new tools	<input type="checkbox"/>	[2]
		so manufacturers can sell more	<input type="checkbox"/>	
		so the product always has the same properties	<input checked="" type="checkbox"/>	
		so the product is cheaper	<input type="checkbox"/>	
		so the product is suitable for its purpose	<input checked="" type="checkbox"/>	
	b	ii		
		Trading Standards (officer) / Building Control Surveyor / Health and safety (Inspector) / environmental	[1]	Inspector/officer interchangeable allow any inspector of a tangible product eg gas allow British Standards Inspector not BSI allow Health/ safety Inspector allow surveyor / quality control personnel reject toy inspector /organisations eg council reject product standards officer
	b	iii		
		British Standards	[1]	allow British Standards Institute/Institution /agency allow British standardisation reject Building Standards
	b	iv		
		another product and safety margin described	[1]	answer must show that product will operate beyond the limits expected e.g. lift can hold more people than designed for (1) but holds more weight (0) as just implies it is strong allow tunnel – stronger than needed but not strong

					allow Food and reference to sell by date (or similar) reject bridge – in stem of question
			Total	[7]	

Question		Expected Answer	Mark	Rationale/Additional Guidance											
4	a	<table border="1"> <tr> <td>properties of ceramics</td> <td>properties of polymer</td> </tr> <tr> <td>brittle</td> <td>flexible</td> </tr> <tr> <td>stiff</td> <td>plastic</td> </tr> </table>	properties of ceramics	properties of polymer	brittle	flexible	stiff	plastic	[2]	ignore order of words within each column 4 words in correct column = 2 marks 2 or 3 words in correct column = 1 mark 0 or 1 words in correct column = 0 marks					
properties of ceramics	properties of polymer														
brittle	flexible														
stiff	plastic														
	b	i	<table border="1"> <caption>Bar Chart Data</caption> <thead> <tr> <th>Material</th> <th>Strength (Series1)</th> </tr> </thead> <tbody> <tr> <td>PMMA</td> <td>~60</td> </tr> <tr> <td>polycarbonate</td> <td>~110</td> </tr> <tr> <td>brick</td> <td>200</td> </tr> <tr> <td>concrete</td> <td>~20</td> </tr> </tbody> </table>	Material	Strength (Series1)	PMMA	~60	polycarbonate	~110	brick	200	concrete	~20	[1]	bar for brick with top between 190 and 210 inclusive ignore width of bars
Material	Strength (Series1)														
PMMA	~60														
polycarbonate	~110														
brick	200														
concrete	~20														
	b	ii	(compressive) strength/ strong (1) hardness/ hard (1)	[2]	values alone are insufficient but accept hardness = 600 (1) and strength = 200 (1) reject compression is high										
	b	iii	tough	[1]	allow toughness is 3300 but 3300 alone = 0										
		Total		[6]											

Question			Expected Answer	Mark	Rationale/Additional Guidance
5	a	i	mass; velocity	[2]	reject weight allow speed/ how fast is going allow Force and time (2 marks) but either alone = 0 Eg mass and time = 1 only for mass reject units alone
	a	ii	proportional to 	[1]	allow indication of 'proportional to'
	b		mechanical property; how property aids safety;	[2]	no mark for identifying device reject references to optical properties
				[5]	

Question		Expected Answer	Mark	Rationale/Additional Guidance
6	a	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">an alloy is...</div> <div style="border: 1px solid black; width: 200px; height: 20px; margin: 5px 0;"></div> <div style="border: 1px solid black; width: 200px; height: 20px; margin: 5px 0;"></div> <div style="border: 1px solid black; width: 200px; height: 20px; margin: 5px 0;"></div> <div style="border: 1px solid black; width: 200px; height: 20px; margin: 5px 0;"></div> <div style="margin-left: 100px;">...a solid solution of elements in a metal</div>	[1]	
	b	<p>hard(er); less easily scratched/blunted/ easier to clean; strong(er); because large force on them; shiny; nice appearance tough; does not break/ stays sharp/ does not snap stiff; does not bend lower thermal conductance; does not get hot durable; lasts longer</p>	[2]	<p>allow less brittle; will not snap as easily reject rusts, cost or density or malleable reject if another metal is listed under property as this infers replacing the metal (0 marks)</p>
	c	<p>make it thicker/ wider prongs / shorter blade or prongs improve shape; change composition/ type of stainless steel</p> <p>use an improved processing method for steel;</p> <p>make into composite</p>	[1]	<p>allow ridges but reject change shape allow add a different metal reject use a different metal / change the material allow any type of heat treatment / mechanical processing allow adding plastic handles</p>
	d	<p>link between heating and an indication of what expansion means: a quantitative method to measure expansion: a method applicable for small measurements of expansion</p>	[1] (1) (1)	<p>can be in words or diagram</p> <p>e.g. ruler or scale for pointer</p> <p>e.g. Vernier / micrometer/ pin and pointer mechanism bimetallic strip being heated worth 1 max</p>
			[7]	
		Total	[36]	

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