

# **Design and Technology: Resistant Materials**

General Certificate of Secondary Education

Unit **A562**: Sustainable Design

## **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.

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Question			Answer	Marks	Guidance
1			c. Hydro-electricity	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
2			b. Making donations of items to a charity shop	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
3			b. Reduce	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
4			a. Forest Stewardship Council	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
5			d. Half-full paint tins	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
6			Dispose of sensibly, (put/throw) rubbish in bin, "Tidyman", (put/throw) litter in bin, do not litter, Keep Britain Tidy	1	<b>Accept:</b> references to putting <i>rubbish/litter</i> in a <i>bin</i> <b>Do not accept:</b> references to recycling; disposable/disposal on their own.
7			Thermochromic/Thermographic	1	<b>Accept:</b> mis-spellings that still convey the meaning (thermochromic, termocromik, etc.) <b>Do not accept:</b> Smart material, thermosetting, thermometer(!), thermo, thermopigment (given in question)
8			Sweatshop	1	<b>Accept:</b> Sweetshop. <b>Do not accept:</b> moral, unsafe, poor, hazardous
9			Ergonomics	1	<b>Accept:</b> Ergonomically/ergonomic design <b>Do not accept:</b> touch-screen, comfort(able), anthropometric, interactive
10			Reforestation, managed forest	1	<b>Do not accept:</b> afforestation, deforestation, forestation, sustainable, carbon offsetting, replace, reforestment, replanting

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11			True	1	No mark awarded if both true and false answers ticked, or the candidate response is not clear.
12			False	1	No mark awarded if both true and false answers ticked, or the candidate response is not clear.
13			True	1	No mark awarded if both true and false answers ticked, or the candidate response is not clear.
14			False	1	No mark awarded if both true and false answers ticked, or the candidate response is not clear.
15			True	1	No mark awarded if both true and false answers ticked, or the candidate response is not clear.
			<b>Total</b>	<b>15</b>	

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16 (a)	<p><b>Look for feature(s) with benefits</b></p> <p>Less packaging to dispose of.</p> <p>Less resources/trees cut down - to make packaging.</p> <p>Could be disassembled for transportation if moving house/recycling/repair.</p> <p>Small package/takes up less space so more on lorry/less fuel used when transporting/smaller building space need for storage, less energy/pollution during manufacture.</p> <p>No factory assembly, so less energy needed.</p> <p>Regularly shaped packages means more can be packed in transport using less fuel.</p> <p>Packaging made from recycled/recyclable materials.</p> <p>Less adhesives/paints used.</p> <p>Reduced road noise/noise pollution/road erosion.</p> <p style="text-align: right;">6 x 1</p>	6	<p><b>Do not accept:</b></p> <p>any reference to economics, costs -</p> <p>“The box is smaller ...” (TV)</p> <p>“Made of softwood so cheaper ...”</p> <p>“Good for the wood”;</p> <p>Better finish.</p>
(b)	<p>Use water instead of solvents such as white spirit.</p> <p>Don't create smells/fumes/health problems.</p> <p>Less harmful to user.</p> <p>Less (in) flammable.</p> <p>Doesn't irritate lungs/airways.</p> <p>Dry quickly so paint coatings don't give off fumes for a long time.</p> <p>Contain more “natural” ingredients.</p> <p>May be less allergenic/safer to use.</p> <p>Contain fewer heavy metals.</p> <p>Coatings are less toxic/less harmful to children.</p> <p>Easier to clean equipment/easier to dispose of.</p> <p>Easily washed off while still wet.</p> <p>Easier/safer to recycle.</p> <p>Seen as/perceived as being more environmentally friendly.</p> <p style="text-align: right;">Any three relevant benefits</p>	3	<p><b>Do not accept:</b></p> <p>any reference to “organisms”;</p> <p>any reference to economics (“cheaper”);</p> <p>any reference to CFCs/ozone layer unless qualified, e.g. spray can</p> <p>Harmful to the environment/environmentally friendly (TV);</p> <p>Easy to recycle;</p> <p>‘They are organic’</p> <p>‘They look better’.</p> <p><b>Do not credit:</b> answers which clearly do not reflect the meaning/understanding of LVOC.</p>

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Question		Answer	Marks	Guidance
	(c)*	<p>Look first at which <b>level – 1, 2 or 3</b> (basic, adequate, good) is the best fit for the candidates' response, then use the information on general/specific points to fine tune the mark.</p> <p><b>0 Marks</b> Answer not worthy of a mark – does not address the question in any way</p> <p><b>Level 1 (1–2 marks)</b> <b>Basic discussion</b>, showing <b>little understanding</b> of self-assembly, including the need for tools as well as manual dexterity, DIY skills and the ability to read a set of plans. There will be little or no use of specialist terms, ambiguous and disorganised answers; errors of grammar, punctuation and spelling may be intrusive. Responses which present ideas only as simplistic bullet points cannot achieve Level 2 (therefore max. 2 marks)</p> <p><b>Level 2 (3–4 marks)</b> <b>Adequate discussion</b>, showing <b>understanding</b> of self-assembly, including the need for tools as well as manual dexterity, DIY skills and the ability to read a set of plans. There will be some use of specialist terms, some structure and format of the answer and occasional errors of grammar, punctuation and spelling.</p> <p><b>Level 3 (5–6 marks)</b> <b>Good, in-depth discussion</b>, showing <b>clear understanding</b> of self-assembly, such as the need for tools as well as manual dexterity, DIY skills and the ability to read a set of plans. There will be correct use of specialist terms, competent structure in format of the answer and accurate use of grammar, punctuation and spelling.</p>	6	<p>Look for discussion relating to the <b>disadvantages to the consumer</b>. <b>Do not accept:</b> discussion relating to advantages, or to the manufacturer/retailer (e.g. costs of transport to the retailer) Specific points that may show in answer</p> <ul style="list-style-type: none"> <li>• need large space to lay out components</li> <li>• not all components may be included (may be missing)</li> <li>• components may be sharp-edged or splintery</li> <li>• hand tools are required, not always included in pack</li> <li>• tool skills need to be reasonable</li> <li>• DIY competence</li> <li>• components need to be strong to withstand being forced into [wrong] place</li> <li>• designs are plain</li> <li>• components may need to be finished and painted</li> <li>• plans are not always easy to read/follow</li> <li>• packaging needs to be disposed of (may include plastic as well as cardboard)</li> <li>• long time to assemble</li> <li>• often a 2 person job</li> <li>• transportation of large packs – roof rack hassle. Hiring vans.</li> <li>• weight of packages – handling dangers</li> <li>• risk of injury – no risk assessments</li> <li>• safety of assembly not checked</li> <li>• risk of young children being harmed during construction</li> </ul>
		<b>Total</b>	<b>15</b>	

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Question			Answer	Marks	Guidance
17	(a)		<p><b>Look for:</b>  <b>group of students + feature(s) of student + feature(s) of desk/chair</b>            Overweight students - difficult to squeeze in between desk edge and seat.            Students using wheelchair - no space to place wheelchair except by the side.            Other examples:            Disabled students – difficult to place legs in comfortable position or to bend the body to get in and out; no arm rests so student could fall out.            Tall students – less knee room under table edge.            Small/Short students – can't reach floor or table edge.            (2 x 3)</p>	6	<p>This question relates to groups of <b>SCHOOL STUDENTS</b>, and as such answers should reflect this.</p> <p><b>Do not accept:</b>            references to any adult groups;            references to babies            references to strength of construction (assume it is strong enough).</p> <p>Marks can still be awarded for identifying correct features, even if group is incorrect (e.g. – adults).</p>
	(b)		<p>Adjustable desk height.            Hinged desk top to allow access.            Curved desk top to allow greater access.            Adjustable seat height/width/depth.            Adjustable desk to seat space.            Removable seat.            Replaceable leg.            Rotating desk to create wheelchair space.            Make table smaller and attach to four-legged chair.            Adjusted width/depth of seat.            (3 x 1)</p>	3	<p>Max 2 marks if ONLY notes OR sketches used</p> <p><b>Do not accept:</b>            product ends up as a separate desk and chair;            strengthening of components;            references to comfort (e.g. padding);            one word labels as notes</p>
	(c)		<p>Unscrew seatback/table frame            Sort/separate materials            Crush frame            Cut up table/seat/back            Appropriate recycling processes – melting, shredding, re-moulding, reusing.</p> <p>One mark for any relevant operation (3 x 1)            e.g. – 'Disassemble, separate, place into correct bin'            "Disassemble desk and chair" = 1 mark only (for <i>disassemble</i>)</p>	3	<p>Do not accept 'recycle' unless qualified.</p>

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	(d)		<p><b>Feature of manufacturing overseas + transportation to UK + disadvantage of either feature</b></p> <p>Can be damaged if not protected by packaging.  Takes up too much space in transporter.  Uses fossil fuel for transporting product.  Large carbon footprint/carbon emissions.  Use of fossil fuel adds to greenhouse effect/pollution  Any three relevant points (3 x 1)</p> <p>Example: Table and chair can be damaged if not protected by packaging (1) takes up too much space in transporter (1) &amp; uses more fossil fuel than necessary as you're transporting air (1)</p>	3	<p><b>Do not accept:</b></p> <p>references to economics;  references to ozone layer;  references to workers' pay/conditions/life;  references to waste disposal in country of manufacture;  references to pollution regulations in country of manufacture;</p> <p>'Getting the product to the UK' is insufficient on it's own.</p>
			<b>Total</b>	<b>15</b>	



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18	(a)		Reuse Refuse Repair  3 x 1	3	Any order is acceptable, but no other wording
	(b)	(i)	<b>Non-biodegradable – acrylic CD rack will not <u>degrade naturally</u></b> Acrylic will not break down naturally. Acrylic will take many years (more than 50) to break down/disappear. Acrylic is plastic which takes a long time to break down in the ground.  2 x 1	2	<b>Do not accept:</b> 'Can't be broken down' (TV) 'Will not rot away'
		(ii)	<b>Planned obsolescence – must refer to an aspect/feature of the CD rack for 2 marks</b> Designer makes sure that product will break/fail/run out after a period of time Manufacturer uses cheap materials to ensure product does not last a long time Users have to buy another one earlier than anticipated	2	<b>Do not accept:</b> References to fashion or style References to updating products to make them more desirable.
		(iii)	<b>Eco-design – must refer to an aspect/feature of the CD rack for 2 marks</b> Design which takes into account environmental effects of manufacture or use Design which looks at the [carbon] footprint of the product Design which reduces energy consumption Rack has no back, saving materials Ease of disassembly/recycling Designed with environment in mind	2	<b>Do not accept:</b> 'designed to be eco-friendly' 'will not harm the environment' 'environmentally friendly' 'using recycled materials'
	(c)		Extraction (of raw materials) Distribution/transportation/selling Using the product  3 x 1	3	<b>Accept:</b> Any reasonable synonym(s) for these terms
	(d)		A measure of the total amount of carbon dioxide (and methane)/greenhouse gases emissions of a product, system or [human] activity.  3 x 1	3	<b>Accept:</b> Comparable references, especially to the "measure" of CO <sub>2</sub> emissions or human impact upon the environment.
			<b>Total</b>	<b>15</b>	
			<b>Paper Total</b>	<b>60</b>	

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