

Design and Technology: Resistant Materials

General Certificate of Secondary Education **A562**

Sustainable Design

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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Section A

Question	Expected Answers	Marks	Rationale
1	(c) Metal	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
2	(a) Product disassembly	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
3	(a) Planned obsolescence	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
4	(c) European eco label	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) Create innovative environmentally friendly designs	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
6	Biodegradable	1	
7	The process of designing a product with the environment in mind	1	Accept: environmentally friendly, ecologically friendly, eco friendly, friendly to the environment. Do not accept: economically friendly
8	Ethical trading initiative	1	All three words to be correct.
9	Plastic	1	Accept any named plastic, thermo plastic, thermo setting plastic.

Question			Expected Answers	Marks	Rationale
10			To enable different types of plastic to be: sorted/classified/identified/recognised/recycled. (must be qualified in one of these ways)	1	Accept to identify which plastic a product is made from. Do not accept: 'what grade the material is'. Reward even if candidate does not mention plastic.
11			False	1	
12			False	1	
13			True	1	
14			True	1	
15			True	1	
16	a	i	Sustainable It can be replenished/re-grown, it is renewable/easily replaced, it will not run out [1]. The wood can be grown again [1]. Plastic is from oil which is not renewable/finite resource/run out [1].	3	Look for the concept that a sustainable material is one that can be replenished. Do not accept: long lasting, lasts a long time, long time, good for the environment. Do not accept: Wood could biodegrade or be burnt. Do not reward the same point twice. Accept using decaying wood as organic material.
		ii	Recyclable Can be reused. Made into something else. Plastic pot could be used as a bin. Plastic re-melted/reformed. Wood difficult to recycle as it deteriorates if outside. Wood used to make something else e.g. a bench/fence. Any three above points. (3 x 1)	3	
		iii	Biodegradable Rots easily in the environment [1]. Wood rots naturally [1]. Plastic will not rot/take 1000's of years to decompose [1].	3	

Question		Expected Answers	Marks	Rationale
	b	<p>Synthetics contain harmful chemicals. Damage/kill animal/plant life. Production of synthetics can cause harmful pollution. Synthetic paint could be made from oil. Any one of these points.</p>	1	<p>Do not accept: less damage to the wood, from a renewable resource. Water based not as harmful to the environment/better for environment – must be qualified.</p>
	c	<p>So customer knows/label shows/proves/informs/emphasise what is in the tin. Customers have a choice, they want environmentally friendly/natural products, they have issues with high volatiles, they are more likely to buy it. Information/advice that nothing will get damaged. Natural/environmentally friendly. Health benefits/more pleasant to use. Any three of the above points. (3 x 1)</p>	3	<p>Accept references to: kind, gentle to user/environment.</p>
	d	<p>A product can be designed in one country [1] and made in another [1]. Parts of a product manufactured in one country [1] and assembled in a different country [1]. Cheap materials from one country [1], cheap manufacture in another [1]. A product may be made in one country [1] and sold all over the world [1]. Product/brand that is sold or recognised all over the world [1], With an example [1].</p>	2	<p>Do not accept: 'world wide', 'all over the world' unless qualified. Accept 'Sold' or 'made all over the world' without further qualification – one mark only. Examples: McDonald/Nike/Apple.</p>
Total			15	

Question		Expected Answers	Marks	Rationale
17	a	<p>The swing is made from recycled materials. Less likely to rot/deteriorate, water resistant. Tougher/harder to break/hardwearing/long lasting/durable, shock absorber. The swing is softer to sit on, more comfortable/ergonomic. The swing has a hole for your bottom so you are less likely to slip off. The swing is less likely to cause injury if it hits some one. The swing has a non - slip surface so you are less likely to slip off. They can lay out on the tyre. Can get more people on the tyre/more space. More fun on the tyre. Three anchor points are potentially safer. One mark for each point.</p>	(3 x 1) 3	<p>Do not accept: environmentally friendly, stronger, heavier/more dense, any reference to the chains or references to appearance.</p> <p>Do not accept: 'safer' unless qualified/exemplified.</p>
	b	<p>Textured coating, rubber applied to seat. Shaped/hollowed to make less likely to slip off. Handles on ropes to hold on to, plastic covers on the ropes. Handles above seat level. Captive bar at front, added sides, added back. Seat belt. Remove all sharp edges, sanding/smoothing of seat. Four attachment points for the rope/chain. One mark for each point.</p>	(3 x 1) 3	<p>Do not accept: references to using chain rather than rope, addition of footrest, making the wood thicker, varnishing the wood, handles at seat level.</p> <p>Maximum of two marks if only notes or only sketches are provided.</p>
	c	<p>i Anthropometrics Physical sizes/dimensions/measurements [1]. Of people/humans [1]. Reference to arms/legs/hands/body parts/weight [1].</p> <p>ii Ergonomics How a product interacts with/fits/accommodates [1] with people [1]. Related to the seat such as: Shape/size of seat, comfort, textured surface, shaped grips to hold [1].</p>	3 3	<p>Do not accept: any references to safety, comfort, fit, ease of use, sizes of the swing Candidates do not need to make reference to the swing seat.</p> <p>Definition of ergonomics [2] Reference to seat [1] Do not accept: any reference to appearance/colour, look of a product.</p>

Question		Expected Answers	Marks	Rationale
	d	Landfill or bury it.	1	Do not accept: recycled, reused, burnt, decompose, biodegrade, throw away. Prepared to accept disposal at sea.
	e	Production of CO ₂ /carbon emissions/greenhouse gasses/global warming. Production of harmful gasses/smoke/ash/pollution/poison. Use of fossil fuels to burn the waste. One mark for each effect.	(2 x 1) 2	Do not accept: references to holes in the ozone layer, 'harming the environment'.
Total			15	

Question		Expected Answers	Marks	Rationale
18	a	<p>Level 1 (0-2 marks) Basic analysis, showing some understanding of manufacturing processes, sources of materials, processing of raw materials, finishing requirements, and disposal. Little or no use of specialist terms. Ambiguous and disorganised answers. Errors of grammar, punctuation and spelling may be intrusive. <i>One general point [1].</i> <i>Two general points or one specific point well made [2].</i></p> <p>Level 2 (3-4 marks) Adequate analysis, showing some understanding of manufacturing processes, sources of materials, processing of raw materials, finishing requirements, and disposal. Some use of specialist terms. Some structure in format of the answer. Occasional errors of grammar, punctuation and spelling. <i>Two specific points adequately made [3]</i> <i>Two specific points well made [4]</i></p> <p>Level 3 (5-6 marks) Good analysis, showing clear understanding of manufacturing processes, sources of materials, processing of raw materials, finish requirements, and disposal. Correct use of specialist terms. Competent structure in format of the answer. Accurate use of grammar, punctuation and spelling. <i>Three specific points adequately made [5]</i> <i>Three specific points well made [6]</i></p>	6	<p>Look firstly at which level – 1, 2 or 3 (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>Specific points that may appear in the answer</p> <ul style="list-style-type: none"> • Plastic is material made from oil which is a non-renewable. • Stainless Steel is a non renewable • Mahogany comes from trees which are very slow to grow. • Mahogany requires a finish many of which are made from oil. • The processing of oil to plastic releases pollution into the atmosphere. • The Acrylic will not biodegrade at the end of its useful life. • Both tables require considerable energy to manufacture the product from raw materials. <p>General points</p> <ul style="list-style-type: none"> • Consider if material can be recycled after use. • Consider if material comes from a sustainable source. • Does manufacturing cause pollution.

Question	Expected Answers	Marks	Rationale
b	<p>Any named fast growing softwood (e.g. pine/fir/spruce) – sustainable, fast growing, locally grown, lots available. MDF – can be made from waste products. Chipboard/Contiboard/Contiplas – can be made from waste products. Blockboard – predominantly softwood off cuts/short ends. Plywood – thinner or contains a large proportion of faster growing timber. One mark for each material. One mark for each reason. (4 x 1)</p>	4	<p>Do not accept: any named ‘hardwood’. Do not accept ‘softwood’ on its own. Do not accept: that ‘these materials are easy to recycle’. Only reward reason if it relates to a correct material.</p>
C(i)	<p>Lower labour costs, lower factory running costs, lower land costs and lower building costs for factory, lower raw material costs, lower transport costs. Mean production costs are lower, products can be sold more competitively and more profit can be made. 1 mark for a point, 1 mark for example/consequence. (2 x 1)</p>	2	<p>Accept: ‘cheaper’ only if qualified.</p>
C(ii)	<p>Local referring to the developing country: Greater employment opportunities/jobs. More money for the family. Increased standard of living, better food, better transport, better healthcare, a better education. OR Local referring to the companies original base (typically in UK): Less pollution. Less noise. Less traffic. Safer environment. Providing a better quality of life. Three linked points, 1 mark each. (3 x 1)</p>	3	<p>Common answer: jobs [1], more money [1], better standard of living [1].</p>
	Total	15	

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