

# **Design and Technology: Resistant Materials**

General Certificate of Secondary Education

Unit **A562**: Sustainable Design

## **Mark Scheme for January 2012**

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Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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**Annotations**

<b>Annotation</b>	<b>Meaning</b>
✓	correct response
SEEN	Extended writing seen and read

## Section A

Question		Answer	Marks	Guidance
1		(c) Breath safely	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) Measurement of human beings	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) Heat	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
4		(d) Are strong & durable	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
5		(b) Be grown or replenished for future generations	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
6		Toxic/poisonous (substance/chemical) Toxins	1	<b>Do not accept</b> any other response such as danger, deadly, harmful.
7		Forest Stewardship Council <b>Accept:</b> Forestry Stewardship Council.	1	
8		Wind/wind turbine; wave; tidal; water; hydro/hydro electric; geo-thermal; biofuel; (sustainable) wood <b>Accept</b> any one of these	1	
9		Aesthetics/asthetics/esthetics <b>Accept:</b> Aesthetically pleasing; mis-spellings	1	

Question		Answer	Marks	Guidance
10		Refuse	1	<b>Do not accept:</b> any other answer
11		False	1	
12		True	1	
13		False	1	
14		True	1	
15		False	1	
			<b>Total</b>	<b>15</b>

## Section B

Question		Answer	Marks	Guidance
16	(a)	<p>Look for references to beliefs, traditions, religion, preference</p> <p>Look for two <b>different</b> issues for example:</p> <ul style="list-style-type: none"> <li>• Vegans / vegetarians (1) would not touch / use animal products (1);</li> <li>• Some religions /Muslims / Jews (1) would not use pig-based products / bristles (1)</li> <li>• Some religions Jainism / Buddhism / Hinduism (1) advocate the practice of non-violence and respect for all life (1)</li> <li>• Some religions / Hindus (1) would not use beef-based products / bone handles (1)</li> </ul> <p>Two points + two <b>related</b> qualifications (2 x 2)</p>	4	<p><b>Do not accept:</b>  references to hygiene unless linked to a person's belief;  references to endangered species;  references to allergies;  references to poaching;  killing animals for their bones;</p> <p>Do not accept any racist or anti religious comments.</p>
	(b)	<p>Non-slip handle (1) to get better grip when wet (1)  Shape of head (1) to get to teeth at the back (1)  Shape of handle (1) for more comfortable hold (1)  Rounded tips/shape of bristles (1) to prevent abrasion to gums (1)  Coloured bristles (1) to show when they're worn out (1)  Flexible neck (1) to allow head to bend in mouth (1)  Rough surface on head (1) to clean tongue (1)  Non-slip / soft grip area (1) to aid grip of hand in wet conditions (1)  Different hardness of bristles (1) to allow cleaning of different areas (1).  The colour (1) enables identification of different toothbrushes/more attractive (1)  An electric toothbrush (1) requires less effort/more effective cleaning (1)  Different length bristles (1) allows better cleaning (1)</p> <p>Two points + <b>related</b> explanation (2 x 2)</p>	4	<p><b>Do not accept:</b>  references to sensitive teeth (function of toothpaste);  references to 19C brush;  references to weight of brush;</p> <p>Feature unrelated to explanation – 1 mark only.</p>

Question	Answer	Marks	Guidance
(c)	<p>A hole/swing lid just big enough to allow clear insertion of battery (1)  Method to prevent battery falling out again (1)  Easy to carry – look for explicit evidence (1)  A means of safely removing the batteries that requires releasing (1)  Mobius style of symbol on the container (1)</p> <p style="text-align: right;">Four features (4 x 1)</p>	4	<p><b>Look for:</b>  Self-sealing hole in lid,  fixed or swivelling handles,  locking / childproof screw lid.  <b>Do not accept:</b>  Symbols relating to ‘do not put in a waste bin’.</p> <p>Sketches only max 3 marks.  Notes only max 3 marks.</p>
(d)	<p>Globalisation  Internationalisation</p>	1	<p><b>Do not accept</b> any other answer.</p>
(e)	<p>Look for two reasons e.g.</p> <p>Too many different materials (1)  Impossible/difficult to separate materials (1)  Hygiene- passing on to someone else (1)  May contain non-recyclable materials (1)  Difficult to identify the type of plastic (1)</p> <p><b>Accept:</b> References to disassembly &amp; recycling of electric brushes</p> <p style="text-align: right;">2 x 1</p>	2	<p><b>Do not accept:</b>  Using toothbrushes to clean items such as keyboards, rocks, bicycle parts, etc.  <b>Do not accept:</b>  ‘plastic’ on its own</p>
	<b>Total</b>	<b>15</b>	

Question	Answer	Marks	Guidance
17 (a)	<p>Look for a feature of the container (1) and an environmental benefit (1) either during use or at the end of its life, e.g.</p> <p>The plastic container can be more easily recycled (1) so it doesn't go to landfill/have to be disposed of (1)  Doesn't use propellants/is hand operated (1) which harm the atmosphere (1)  Plastic bottle can be refilled (1) and reused/not go to landfill (1)  The steel can contains a propellant/solvent (1) that could be harmful to the environment (1)  The steel container is harder to recycle because of its construction/ contents/pressurisation (1) and could end up in landfill (1)  Two points + two exemplifications (2 x 2)</p>	4	<p><b>Do not accept:</b>  references to ergonomics;  references to energy in manufacturing (unknown quantity);  "it's recyclable" (so is steel)</p>
(b)	<p>Thermopaint / Thermochromic / Thermosensitive.  Thermopigments / Thermochromic pigments.  Leuco dye.  <b>Accept:</b> any recognisable spelling.</p>	1	<p><b>Do not accept:</b> thermal paint (this is an insulating material); "smart" (too generic)</p>
(c)	<p>Look for a feature of the bottle (1) and an explanation of its ergonomic benefit (1) e.g.</p> <p>Narrow neck (1) enables hand to grip securely (1)  Pistol grip (1) stops finger slipping off (1)  Back of spray gun (1) allows head to fit between thumb and index finger (1)  Milled edges of nozzle / screw top (1) allows ease of removal / turning (1)  Curved trigger (1) prevents fingers slipping off (1)  Bottle is light/lightweight/small (1) so easy to carry/use (1)  Trigger close to gripping hand (1) so easy to reach and pull back (1)  Finger grooves on head (1) make the bottle easy to hold (1).  Smooth surface (1) more comfortable to hold (1)  Clear plastic (1) allows user to see contents (1)  The weight of the bottle is near the base (1) so it provides better balance (1)  Two points + two related qualifications (2 x 2)</p>	4	<p><b>Do not accept:</b> any response relating to anthropometrics or aesthetics.</p> <p><b>Do not accept:</b> References to features of the steel can.</p> <p><b>Do not accept:</b> refillability,</p>



Question		Answer	Marks	Guidance	
	(d)	<p>Look for any definition that implies <b>ease</b> of burning or igniting.</p> <p>Able/liable to catch fire easily (1).            Inflammable (1).            Readily combustible (1).            Easily ignitable (1).            Easily burnable (1).</p> <p style="text-align: right;">One reasonable definition</p>	1	<b>Do not accept:</b> May explode (explosive)	
	(e)	i	Harmful/Irritant/Chemical	1	<b>No other answers acceptable</b>
		ii	<p>Look for informing/warning (1) with a relevant course of action (1)            or            Look for informing/warning (1) and advantage of symbol over words (1)</p> <p>Symbol informs/warns users of possible danger (1) without words (1).            User can recognise symbol (1) although unable to read/speak language (1).            Tells user to be careful (1) so user can make a choice to use the product or refuse to use it (1).</p> <p style="text-align: right;">(2 x 1)</p>	2	
<b>17</b>	(f)	<p>Oil (1); grease (1); wax (1); WD40 (1); waxoil (1); tin plating (1); plastic coating (1); galvanising (1);</p> <p style="text-align: right;">Two reasonable points (2 x 1)</p>	2	<p><b>Do not accept:</b> chrome plating, laminating</p> <p><b>Do not accept:</b> coatings which imply the given coating in the question, i.e. varnish; lacquer; polish; sealant; keep dry</p>	
		<b>Total</b>	<b>15</b>		

Question	Answer	Marks	Guidance
18 (a)	<p>Attractive (1); less threatening (1); could be sustainable timber (1); easier to repair than metal version (1); allows more imaginative play (1); causes less damage (1); withstands more damage (1); no possibly toxic paints (1); less damaging/harmful to the user (1); biodegradable (1); less harmful to the environment (1); doesn't rust (1); doesn't need batteries/electricity (1); reference to 'nostalgia'</p> <p style="text-align: right;">Two points (2 x 1)</p>	2	<p><b>Do not accept:</b> references to cost; small parts; easier to recycle; sharp edges (both have small parts and sharp edges); choking;</p>
(b)	<p>Responses must relate to: raw materials, product in use, end of life For example:</p> <p>Hardwood can be from sustainable forests (1) renewable source (1). Plastics are made from oil (1) which cannot be replaced (1). Pollution (1) during manufacture of plastics (1).</p> <p>Hardwood is easier to repair (1) less likely to be discarded (1). Hardwoods/metals are more durable (1) plastics less durable/likely to be brittle (1).</p> <p>Plastic toys difficult to recycle (1) unless made from just one plastic (1) Hardwood is biodegradable (1) less going to landfill (1). Metals are simpler to sort (1) for recycle (1). Plastic is hard to recycle (1) difficult to recognise different plastics (1) Metal can be recycled (1) saving natural resources (1). If plastic is burnt/incinerated (1) it gives off harmful gases (1). Plastic is not usually biodegradable (1) ends up in landfill (1).</p> <p style="text-align: right;">(4 x 1) or (2 x 2)</p>	4	<p><b>Do not accept:</b> eco-friendly (TV); energy used in manufacturing/recycling (same for these materials) 'Stronger' on its own is too vague</p> <p>One mark for each statement made (4 x 1) or One mark for the statement and one mark for the reasoning (2 x 2)</p>
(c)	<p>Answers can relate to advantages of wind up or disadvantages of batteries. Hand operated (1); less energy used (1); no batteries/electricity needed (1); leaking batteries cause corrosion (1); sustainable (1); clockwork motor easier to repair (1); clockwork mechanism causes less pollution (1); cheaper because easier to repair (1); uses a renewable energy source (1); more environmentally friendly (1)</p> <p style="text-align: right;">(1)</p>	1	<p><b>Do not accept:</b> cheaper / safer unless properly qualified. References to wind power.</p>

Question	Answer	Marks	Guidance
(d)*	<p><b>This part is about the <u>environmental</u> effect of manufacturing abroad, not about selling/consuming in the UK</b></p> <p><b>Level 1 (0 – 2 marks)</b> Basic discussion showing some understanding of how manufacturing and transportation might affect the environment. There <b>may</b> be reference to unregulated and/or uncontrolled pollution / waste / extraction / transportation / energy / pollution. <b>There will be little or no use of specialist terms. Answers will be ambiguous and disorganised and there will be errors of grammar and punctuation. Spelling will be intrusive.</b></p> <p>Bulleted points, or text which merely lists points <b>without</b> discussion, cannot gain any more than 2 marks (Level 1 only) no matter how relevant they might be.</p> <p><b>Level 2 (3 – 4 marks)</b> Adequate discussion showing an understanding of how manufacturing and transportation could affect the environment. There <b>ought to</b> be reference to unregulated and / or uncontrolled pollution / waste / extraction / transportation / energy / pollution. <b>There will be some use of specialist terms. Answers will be reasonably clear and presented in a mainly structured format. There will be occasional errors of grammar, punctuation and spelling.</b></p> <p><b>Level 3 (5 – 6 marks)</b> Thorough discussion showing clear understanding of how manufacturing and transportation would affect the environment. There <b>should</b> be reference to unregulated and/or uncontrolled pollution / waste / extraction / transportation / energy / pollution. <b>Specialist terms will be used appropriately and correctly. Answers will be clear and presented in a structured format. The candidate will demonstrate the accurate use of grammar, punctuation and spelling.</b></p>	6	<p>Look firstly 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 specific points to fine tune the mark. Answers do not have to refer to the robot(s).</p> <p>Specific points that may show in answer:</p> <ul style="list-style-type: none"> <li>• heavy use of non-renewable fuels;</li> <li>• more resources available in larger country;</li> <li>• poor control of carbon footprint;</li> <li>• possible inefficient energy supplies;</li> <li>• Kyoto Protocol;</li> <li>• pollution of natural waters and sewage systems, air (VOCs, dust);</li> <li>• noise, odour &amp; waste pollution;</li> <li>• factory building;</li> <li>• water / raw material extraction</li> <li>• transport emissions (ship, truck, plane);</li> <li>• transportation damage to roads;</li> <li>• carbon offsetting / footprint;</li> <li>• global warming / greenhouse gases / greenhouse effect;</li> <li>• positive effects of not manufacturing in the UK</li> </ul> <p><b>Generalised answers</b> relating to pollution, noise, built environment cannot provide Level 3 responses. Award max 4 (Level 2)</p> <p><b>Do not accept</b> answers which relate to labour conditions, lifestyle, profit margins, consumer preferences, cost savings, increase in savings / investments; importing diseases; quality of manufacture</p>

Question		Answer	Marks	Guidance
	(e)	<p>HSE works to reduce injury and/or death (1)  HSE works to ensure staff and visitors are protected from danger (1)  HSE encourages management to consult with employees (1)  HSE encourages provision/maintain of acceptable levels of safety/safety training (1).  Risk assessment has to be undertaken (1).</p> <p style="text-align: right;">Two points (2 x 1)</p>	2	<p><b>Do not accept:</b> more than one reference to the wearing or provision of safety clothing/equipment;  references to minimum pay;  references to litigation/compensation</p>
		<b>Total</b>	<b>15</b>	

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