

Design and Technology: Resistant Materials

General Certificate of Secondary Education

Unit **A562**: Sustainable Design

Mark Scheme for June 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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.


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Annotations

Centres can now access all their scripts for a fee and need to have a clear and coherent set of annotations applied to each and every paper regardless of the material area. The need for Centres to have results enquiries will be reduced if they understand exactly how papers have been marked.


All examiners of the D&T Innovator suite question papers must use these annotations.

When examiners are found not to have used these guidelines they will be graded accordingly and might not be used in future sessions.

A  tick is to be used to show the correct answer.
Marks awarded must be equal to the number of ticks shown.









BOD can be used if required.

Do not to use 

Do not to use 

Banded mark scheme questions to show **L1, L2 or, L3 only** – do not use ticks

Where a **list or bullet points** have been used to answer the Banded Mark Scheme question a **maximum mark of 2** is to be given.

	BOD	Benefit of doubt	Use as appropriate
	Caret	Caret sign to show omission	Use when a partial answer is given
	L1	Level 1	Use in banded markscheme responses only
	L2	Level 2	Use in banded markscheme responses only
	L3	Level 3	Use in banded markscheme responses only
	REP	Repeat	Use when additional but is restating the same point
	SEEN	Noted but no credit given	Do not use instead of a cross for a wrong answer
	Tick	Tick	Ticks must be equal to the number of marks given

Question			Answer	Marks	Guidance
1			(a) Product needs less material in its manufacture	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
2			(d) Take account of the values of society	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
3			(c) 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			(a) Carbon Footprint	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
5			(c) Assist in designing a similar product that may be more eco-friendly	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
6			British Standards Institute (must be BOTH British AND Standards) 'British Standards' on its own.	1	
7			Kite; kite mark	1	Do not accept: references to health or safety; BSI; British Standards; BSI symbol; symbol of quality
8			Biodegradable, Biodegradability	1	Do not accept: rot; eco-friendly; degradable
9			Thermosetting (the GROUP is required, not a specific plastic) Thermoset	1	Do not accept: thermo(forming) plastic or a named thermoplastic (e.g acrylic)
10			SMA; shape memory alloy; shape memory polymer; Polymorph; thermochromic; polychromic; piezo-electric; nitinol; autoheal; black light pigment; cold-formed plastic; ecofilm; electro-luminescent wire; Faraday film; hydrochromic paint; "silly putty"; smart grease; smart wire	1	Do not accept: nano technology; carbon fibre; Kevlar, GRP, other fibre-reinforced fabrics/plastics If unsure do an internet search for the named material. Do not accept 'memory foam'.

Question			Answer	Marks	Guidance
11			True	1	No mark awarded if both true and false answers ticked, or the candidate response is not clear.
12			True	1	No mark awarded if both true and false answers ticked, or the candidate response is not clear.
13			False	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			False	1	No mark awarded if both true and false answers ticked, or the candidate response is not clear.
			Total	15	

Question			Answer	Marks	Guidance
16	(a)		Features: Few/two materials in its make-up Easy to disassemble Cast iron/brass easy to melt down Not complicated No plastics/batteries/paint/electronics Justifications: so quick to separate for recycling so less energy used to melt cast iron or brass so they are quick to recycle so makes them easier to separate for recycling as electrical components are difficult to recycle <div>2 x 2</div>	4	Look for one feature and one appropriate justification for two marks. The same justification can be used for two different features Example: 'Type A doesn't use batteries (1) so it doesn't have to be taken to a specific area to be recycled (1)'
	(b)	(i)	Definition (1 mark): Does its job well/ how well it works Only does one job (one function only) Meets the design specification Does what it's supposed to do Fulfils its purpose Fit for purpose <div>1 mark</div> Explanations (2 x 1 mark): Holds/pours ingredients safely Weighs/Measures Accuracy <div>2 x 1</div>	3	Must relate to the function of weighing, and must refer to any of the scales Do not accept: Easy to use Easy to move around Description of how the scales work
		(ii)	Definition (1 mark): How the product interacts with the user's senses The design of a product makes it easy to use <div>1 mark</div> Explanations (2 examples): Comfortable to use by most cooks/chefs Made to suit peoples' hands when using the scales Weight of food can be easily read/seen Made to match peoples' hands/eyes Big screen so easy to read Easy to use/easy to move around <div>2 x 1</div>	3	Must relate to ease of use and can refer to any of the scales Do not accept: Anthropometric Environmentally friendly 'with the user in mind' – Too Vague

Question			Answer	Marks	Guidance
	(c)	(i)	Bowl changed from copper through s/steel to plastic Shape changed from dish to bowl Addition of spout and handle Modern bowl is lighter Size Weight	1	Do not accept: references to the scales – answers must relate only to the bowl (shape or material).
		(ii)	Technological advancement Material changed for lightness Ease of cleaning Material changed to eliminate painting/polishing Shape changed from dish to bowl to make it easier to mix ingredients Bowl developed to avoid having to transfer ingredients to mixing bowl Easier/quicker to use/read Availability of plastics/molding techniques Use of accurate digital/electronic systems Plastics easier to mass produce Market pull/consumer push More accuracy Plastic not available in the past 2 x 1	2	This is a WHY, not a HOW question Do not accept: References to cost References to batch production Comfortable – Too Vague Accept references to the bowls or the scales
	(d)		More wastage of materials (trimming) Material has to be pre-formed into sheets before vac forming (more energy needed) Heat/energy/power needed to soften plastic 2 x 1	2	This is about the disadvantages of vacuum forming, not about the use of plastic, or the difficulty of recycling the scale, or the energy needed to make the plastic – fossil fuels would be used for ANY plastics manufacturing or forming technique. Do not accept: uses machinery (unless qualified by reference to use of power); gives off gases into atmosphere; plastic cannot be recycled after forming
			Total	15	

Question			Answer	Marks	Guidance
17	(a)		Padding to seat/edges of “cockpit”/arm rests Taller back Side supports/handles Foot rests Hand brake/brake mechanism Larger wheels Softer/wider tyres Safety belt Round off corners/edges Steering mechanism Mudguards <div>3 x 1</div>	3	Notes but no sketch Sketch but no notes 2 marks maximum Notes must provide more information than the sketch shows This is not a question about technical aspects of D&T; we can't penalise candidates if the steering wheel is not connected to the front wheels or the footrests are floating above the front axle.
	(b)		Softwood more likely to be thrown out for recycling/more available Sustained forests/is sustainable/ grows fast (within a generation) Softwoods need less energy to cut down Softwoods cause less environmental damage when felled Deforestation of tropical hardwood forests threatens wildlife <div>Two related points 2 x 1</div>	2	Accept: references to hardwood IF they imply a comparison with softwoods; Do not accept: Biodegradable More softwood around Eco-friendly (TV) Light/cheap/durable Recyclable References to CO ² absorption
	(c)		Disassemble for reuse/heating Break down cart into component parts & separated Timber can be reused for garden planters and other garden “furniture”/toys Nuts/bolts can be saved for other projects Wheels set aside for re-use Other items to be crushed before landfill (take to council waste disposal sites)/metal scrap melted down Timber to be shredded/chipped Chips used for industrial heating or briquettes or wood burning stove or playground surfaces or gardening Rubber tyres to be shredded for specialized burning/heating plants Tyres shredded & used for road/path/playground surfacing. Flip flops. Mats. Belts etc.	4	This is about disposing of, not primary recycling, the “end-of-life” kart Do not accept: Leave wood to rot naturally/landfill Recycle it (TV) General statements about recycling or reusing to make something else(without example) Give the whole go kart to someone else References to use in manufactured boards

Question	Answer	Marks	Guidance
17 (d)*	<p>Look first 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>Level 1 (0–2 marks) Basic discussion, showing little understanding of using recycled or reclaimed materials. 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>Level 2 (3–4 marks) Adequate discussion, showing some understanding of using recycled or reclaimed materials (reclaiming, cleaning, disinfection). 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>Level 3 (5–6 marks) Good, in-depth discussion, showing clear understanding of using recycled or reclaimed materials (de-nailing, cleaning, disinfection, de-bugging). There will be correct use of specialist terms, competent structure in format of the answer and accurate use of grammar, punctuation and spelling.</p> <p>All five points listed here do not have to be found in the response for Level 3 – these are suggested responses that may be seen</p>	6	<p>Question is about using recycled/reclaimed materials not buying the products made from them. The answer should not be a discussion about the (dis)advantages of recycling (less oil used, de-forestation, etc.)</p> <p>Specific points that may show in answer</p> <p>Reclamation</p> <p>De-nailing</p> <ul style="list-style-type: none"> • Remove all previous fixings before sizing, planing or thicknessing • Splinters, sharp metal edges. <p>Cleaning</p> <ul style="list-style-type: none"> • Remove rust, dust, dirt by scrubbing/grit blasting • Treat to remove fungal spores • Colour/aesthetics of differing woods • Possibility of lead-based paints. <p>Disinfection</p> <ul style="list-style-type: none"> • Treat to remove bacteria • Bleach/toxic chemicals. <p>De-bugging</p> <ul style="list-style-type: none"> • Toxic chemicals to remove woodworm, beetle. <p>Quality</p> <ul style="list-style-type: none"> • Reclaimed materials cannot be quality assured and could affect quality of finished item • Range of uses therefore more limited than using virgin materials • Possibility of handling stolen goods <p>Reuse</p> <ul style="list-style-type: none"> • Possible weak material (unknown plastic/metal sources) • Possible use of incorrect or inappropriate plastic. • Size of materials to be reused <p>Do not accept: references to cost of any/all of the above – we have no way of knowing how much recycling costs.</p>
	Total	15	

Question			Answer	Marks	Guidance
18	(a)	(i)	Stainless steel Bronze/brass Aluminium alloy Nylon A relevant point	1	Do not accept: plastic (TV); aluminium (too soft); (mild) steel; iron
	(b)		Look for: Möbius Loop (triangular or circular shape with 3 arrow heads) Reference to relevant code number (1 – 7) Written name of plastic that corresponds to code number Three points 3 x 1	3	Accept: a recognisable attempt at the triangular loop symbol Notes must clarify the sketch Do not accept: labels 1(PET/PETE), 2(HDPE), 3(PVC), 4(LDPE), 5(PP), 6(PS), 7(other)
	(c)	(i)	Conformité Européenne European Conformity	1	Ignore: (lack of) accents Do not accept: European Standards/Regulations Central Europe Certified European European Community
		(ii)	The mark tells/informs/shows the user (means) that: 1 mark <ul style="list-style-type: none"> Assessed for conformity/conforms to EU (trading) legislation Product may be legally sold in EU Complies with/meets EU safety, health or environmental protection requirements Product can be traced back to its source Consumer can be confident the product conforms to relevant requirements Product is safe to use Meets safety standard/regulation Has been checked against EU legislation 1 mark	2	The first mark can only be awarded if the second part is correct Do not accept: Made in EU Product has <i>passed</i> European standards/tests CE marking is a key indicator of a product's compliance with EU legislation A manufacturer is declaring conformity with all of the legal requirements to achieve CE marking and therefore ensuring validity for that product to be sold throughout the EEA The product is assessed before being placed on the market

Question		Answer	Marks	Guidance
	(d)	<p><i>Repair</i> Mend product when it breaks Replace fixings if lost or broken (nuts and bolts) Check edges for damage such as sharp corners and smooth down with suitable tool</p> <p><i>Redundant</i> Users have become too big to use the slide Users have grown out of/bored with the toy Users have got other toys which hold their interest longer Some components are unnecessary, or the design is unnecessarily complicated Slide packed away for the winter and not needed in the garden</p> <p>One qualified point from each heading (2 x 2)</p>	4	<p>Accept: <i>Repair</i> synonymous terms Look for a specific repair – ‘replace bolts’</p> <p><i>Redundant</i> Do not accept: references to the slide breaking or being unsafe to use – this is not redundancy Reference to use of too much energy – we don’t know this Slide has been superseded by a more fashionable product References to obsolescence – being out-of-date is not the same thing as redundancy</p>
	(e)	<p>Transport as many items as you can/at same time/use larger vehicles, so less fuel needed Disassemble items after manufacture, assemble at point of sale Reduce the packaging to reduce volume Taking large loads and delivering to a number of stores rather than separate journeys to each store Design shapes that can be nested Products can be re-designed to use lighter components Flat packing products to enable more on the lorry</p>	4	<p>This is a question about WHEN large goods are transported to the consumer, not about saving energy IF goods have to be transported to the consumer</p> <p>Do not accept: use bio-fuel (still uses energy) move the factory resource locally/store items locally (still needs to be transported to the consumer) use more efficient fuel</p>
		Total	15	

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