RECOGNISING ACHIEVEMENT

GCSE

Design and Technology: Resistant Materials

General Certificate of Secondary Education

Unit **A562:** Sustainable Design

Mark Scheme for June 2012

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Section A

Question			Answer	Marks	Guidance
1			(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.
2			(c) Changing plastic bottles into fleece fibres	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) Natural gas	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) Eco-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			(d) Heat	1	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate response is not clear.
6			Fairtrade	1	**Accept**: Fairtrade Foundation.
7			Carbon	1	**Do not accept:** carbon footprint ("carbon footprint offsetting" appears not to be a recognised term)
8			Eco-design Sustainable design Eco-friendly	1	**Accept**: Environmental Effect Analysis. **Do not accept:** eco-awareness (TV), eco-footprint (measurement, not design)
9			Anthropometric data	1	**Accept**: misspellings.
10			Repair	1	Has to be **R**epair

Question			Answer	Marks	Guidance
11			False	1	
12			False	1	
13			False	1	
14			True	1	
15			False	1	
			Total	**15**	

Section B

Question			Answer	Marks	Guidance
16	(a)		Will heat small quantities of water (1) as element is under/at bottom of kettle (1) Easy to see water level (1) to prevent overfilling (1) The plastic body acts as a heat insulator (1), so less heat is lost to the environment in use (1) Tight lid/small spout (1) keep heat in (1) Switches off automatically (1) to prevent over-boiling (1) Indicator light (1) shows that power is being used (1) Tall narrow shape (1) means small amounts of water can be boiled (1). Internal heating element (1) means less energy is wasted around sides (1) Metal kettle wastes (1) heat/gas/electricity around the sides and metal body loses heat faster (1) than the plastic one Two features + two explanations 2 x 2	4	**This question is about the kettles in use and not about their manufacture or recyclability.** **Do not accept** • references to shape of handle (ergonomics), alternative power source (HAS to be electricity), general design shapes, electricity being more efficient than gas (it isn't). • references to wasted energy unless clear reference to the energy being lost – eg naked flames. • any direct references to the metal kettle UNLESS a comparison is made between that and the plastic jug. • **h**eats up faster unless qualified. • cleaner energy (not a design feature) • uses less energy because it boils quicker. I*t takes the same amount of energy to heat one litre of water no matter which method of heating used. The only difference in the methods is the amount of time each takes.*
	(b)	(i)	**Aesthetics** Look for: references to how product appears through its size/proportion, form/shape, colour, texture, pattern. How it looks/what it looks like (good or bad)/beauty/pleasing) (1) or How it feels/what it feels like (smooth/rough) Colour/plain Pattern Texture/smooth/rough/shiny/matt/ Shape/tall/squat/style/design/proportion/chunky Taste/smell (relevant to the plastic kettle only) Definition = (1) Two Features = (2 x 1) or One feature well explained = (2)	3	**Accept** negative definitions as well as positive **Do not accept**: Any reference to anthropometrics, ergonomics/size or definitions of either term; hearing (irrelevant); one-word answers without any qualification; comfort (ergonomics); fashion – references to tradition/nostalgia/modern (subjective). Definitions without reference to either kettle = Max 2. A specific feature does not have to be cited, provided that either kettle is referenced.

Question			Answer	Marks	Guidance
		(ii)	**Repair** *Example:* Repair means to fix it, mend it or replace a part. **Fault** **Repair** *Metal kettle* Handle/knob broken Replace/scavenge/glue Lid lost/broken Obtain new/2nd-hand one Hole(s) in body Nut/bolt/washer Dent(s) in body Hammer out Spout cracked Solder *Plastic kettle* Cracked body/handle Epoxy/araldite Fuse blown Replace Plug top cracked Replace Cable frayed/faulty Replace Element damaged. Replace Definition = (1) Identify Fault = (1) Method of repair = (1)	3	**This question is about repairing either kettle shown in the question.** **Do not accept:** make something better; general answers relating to repair, not related to the kettles, or referring to other products; unqualified comparisons **Accept:** replacement of filter(s) and cleaning out of lime scale **Do not accept**: any reference to recycling or any other of the 6Rs. For the 'repair' mark the 'fault' must be described.
	(c)		**Both kettles must be referred to.** **Metal kettle** Take off handle/knob (1) and melt down body/lid (1) Handle to landfill/crushed for inert filler (1) lid as small tray for nuts/bolts (1). **Plastic kettle** Remove element (1) and grind body for inert filler (1) Remove electric flex (1) and set aside for re-use (1) Landfill base (1) and melt down body (1). *Example:* The plastic kettle could be taken apart (1) and the components sorted (1) into different types. Metal kettle parts (1) can be crushed, thermoplastics (1) can be melted down and re-used. Two kettles + two relevant explanations (2 x 2)	4	**This question is about disassembly** **Accept**: Use/reuse body (1) as bird's nest/plant pot/watering can (1). **Accept:** Polypropylene (PP) difficult to recycle (PP5 recycling logo). Too many varieties of (PP) **Disassembly can be inferred.** **Do not accept** vague or unrelated (to the kettles) references to recycling; give away to charity shop (kettles have reached the end of their useful life);

Question			Answer	Marks	Guidance
	(d)		Acts as heat insulator/prevent burns Plastic is poor conductor of heat Don't need separate cloth/heat-proof glove to lift hot kettle Safer than using cloth over naked flame Safer than metal handle. Metal handle would conduct heat *(implies if made from plastic it would not conduct heat)* So you don't burn yourself (vague, but just acceptable)	1	**Accept:** plastic does not conduct heat (not technically accurate, but acceptable here) **Do not accept**: safe, cheap, smooth, easy to grip UNLESS qualified. :
			Total	**15**	

Question			Answer	Marks	Guidance
17	(a)*		**This part is about *HOW the recycled or waste materials could be made into chairs*, not about how to recycle the chairs or environmental effects of manufacturing; do not award references to cost of either materials or energy of manufacture.** Specific points that may show in answer. **Plastic** • Can melt down other plastic items of the same material, regardless of colour (strong colour of chair) • Initial set-up of moulds is very expensive • Injection moulding of components (do not accept an essay about injection moulding) • Needs machinery and power inputs at each step of process • Cannot simply re-use existing plastic components unless taken from identical bench. • Plastics need to be collected and separated **Accept**: Almost impossible to make this chair from waste materials without treatment first. **Wood** • Can use ends of longer lengths/off cuts/waste • Can cut down & plane/thickness larger sections of timber from demolition • Paint/coat with preservative to disguise different recycled wood used • Can use lot of hand labour – very little machining actually required • Not easy to get quality recycled wood • Manufacturing causes pollution.	6	Look firstly at which **level – 1, 2 or 3** (basic, adequate, thorough) – is the best fit for the candidates' response. Bullet points/lists award only level 1. Answer may refer to just one chair, plastic **or** wood. **0 marks** **Discussion wholly outside the topic**, no evidence of any understanding of the thrust of the question (eg talking about recycling of the garden chairs, rather than making them from recycled materials) **Level 1 (1 – 2 marks)** **Basic discussion** showing some understanding of how the product **may** be put together. 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. **Level 2 (3 –4 marks)** **Adequate discussion** showing an understanding of how the product **could** be put together. 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. **Level 3 (5 –6 marks)** **Thorough discussion** showing clear understanding of how the product **would** be put together. 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.

Question			Answer	Marks	Guidance
	(b)		Example answers could include: Round off edges; smooth seats; curved back rest; higher back rest; reclined back rest; bottom-shaped seat; curved back; deeper seat to stop bottom sliding off; permanent addition of softer top surface (rubber, etc); wider seat board(s); addition of arms; adding a foot rest; carrying handle One sketch with notes = (2) Two sketches adequately explained with notes or One sketch well explained by extensive notes = (3)	3	**Do not accept**: ***labels*** on drawing – notes must expand upon what can be easily seen; loose cushions; non-specific "padding" **Accept** sketched additions on the given drawing Max 2 marks if ONLY notes OR only sketches used. NOTE: we're not testing candidates' knowledge of construction details, so we can't apply marks for this
	(c)		Example answers could include: Fewer/no solvent vapours/pollution in atmosphere Less toxic/harmful/damaging to plants/humans/animals/environment; Made from natural ingredients; Little or no non-renewable resources used in manufacture of low VOC paint; Not oil-based Any two points (even if both are in same sentence (2 x 1)	2	Answers must show *understanding* of low VOC products for any award of a mark. References to organic chemicals/food/farming or organisms cannot be credited in this context. **Do not accept:** safer to use unless qualified; environmentally-friendly (TV); references to low VOCs being *better* for the wood as they are both organic are irrelevant; makes wood easier to clean
	(d)		Example answers could include: Lightweight; moved easily; self-coloured; comfortable; stackable; doesn't require painting or protective coating; easy to clean; does not rot; durable; waterproof; lasts a long time (so financially beneficial); one-piece; low maintenance; safer for children as they will not fall off; shaped for comfort Any two points (2 x 1)	2	**Do not accept**: light, safe, stored/storable, without correct qualification; any reference to cost; references to manufacturing or manufacturers or transportation; easy to recycle
	(e)		Example answers could include: Quality of life; greater chance of employment; foreign investment in country's economy; better/fair pay; improvement in life-style (education/well-being/housing); learning new skills; learned skills can be passed on to others; greater opportunity for social interaction. Any two points (2 x 1)	2	**Accept**: references to benefits to the residents of the company's "parent" country (eg quieter/cleaner environment, more space, better life style, less industrialisation, improved well-being knowing helping LEDC). **Do not accept:** references to cost/cheapness of chairs
			Total	**15**	

Question			Answer	Marks	Guidance
18	(a)		1 Raw Materials/obtain raw materials 2 Manufacture/assembly/process raw materials 3 Distribution/warehousing/selling/buying 4 Product use/product life Must be in correct order but not necessarily in the correct boxes 1 mark for each point made (4 x 1)	4	**Accept**: any reasonable synonym for each point eg Transport for Distribution. **Do not accept:** synonyms for disposal We cannot penalise if correct response is not in correct position – LCA is not cast in concrete If more than one answer given in a stage all must be correct otherwise no marks
	(b)		Smooth/rounded surfaces/no sharp edges or corners (1) to prevent injury (1) Back support (1) to prevent rider falling off back (1) Foot rests (1) to prevent rider trapping feet under rockers (1) Rockers wide apart/long enough/shaped (1) for stability/to prevent over rocking (1) Handles(1) to provide grip for rider's hands/greater control (1) Identify two features = (2 x 1) Safety reasons for features = (2 x 1)	4	**This question relates to the design of the horse, not the manufacturing. Answers must refer to features of the horse, not generalised H&S aspects** **Do not accept**: references to manufacture, to recycling, to paint finishes, to toxicity of components; to sanding it down
	(c)		**"Look to see if there are"…** No sharp edges No splinters Smooth/sanded surfaces Non-toxic paint finishes **"Look to see if"…** Parts fit together accurately/accurate dimensions of parts Joints cut accurately Small parts are fixed firmly The quality/strength of the materials are of a suitable quality Safe assembly – no loose or poorly fitted components Four different points (4 x 1)	4	**This question relates to safety checks DURING MANUFACTURE, not when in the design stage, when completed or in the home** **Do not accept**: references to cost, environment; references to tests carried out ***after*** manufacture; references to evaluation; references to health and safety equipment. There must be an evident understanding (or implication) of INSPECTING or CHECKING **DURING** manufacture for an award of a mark.

Question			Answer	Marks	Guidance
	(d)		Planned/Built in (1) obsolescence (1); Product designed to last for/break down after (1) a certain length of time (1); Product becomes obsolete (1) after a certain time (1); Using cheaper/lower quality components (1) to ensure product breakdown after a time (1); Introducing new products (1) which are incompatible with older models (1). For the third mark, an example of the type of product under discussion may be appropriate: rechargeable batteries loosing charge; incandescent light bulbs; mobile phones; computer software/hardware OR a corollary to the original argument is supplied, ie “The product will break after a certain time (1) so the user has to go and buy a new one (1) which means the manufacturer makes more money (1)” Three relevant points (3 x 1)	3	**Look for obsolescence** **Do not accept**: references to fashion or style, references to product only being used by a limited number of people/age groups; answers that include “limited time” (too close to the question) Do not accept references to user “Buy a replacement” is too vague (you may buy a replacement mobile phone after using it for – say – 5 years; this is not “limited product lifetime”, especially if it’s still working)
			Total	**15**	

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