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Mark Scheme

Summer 2016

Pearson Edexcel in GCSE Design & Technology: Resistant Materials (5RM02/01)

KNOWLEDGE & UNDERSTANDING

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1	D	**(1)**
Question Number	Answer	Mark
2	A	**(1)**
Question Number	Answer	Mark
3	D	**(1)**
Question Number	Answer	Mark
4	C	**(1)**
Question Number	Answer	Mark
5	B	**(1)**
Question Number	Answer	Mark
6	C	**(1)**
Question Number	Answer	Mark
7	C	**(1)**
Question Number	Answer	Mark
8	C	**(1)**
Question Number	Answer	Mark
9	A	**(1)**
Question Number	Answer	Mark
10	D	**(1)**

Question Number	Answer	Mark
11. (a)	<table><tr><th></th><th>Name</th><th>Use</th></tr><tr><td>ai</td><td>Hammer/ pein hammer / 'warrington' hammer / cross pein (1) (only answers)</td><td></td></tr><tr><td>aii</td><td></td><td>Drilling holes/ drilling in wood/ make a hole in wood (Do not accept any responses that make reference to materials other than wood) (only answers) (1)</td></tr><tr><td>aiii</td><td></td><td>Removal / shaping of wood / foam (1) (Do not accept materials other than wood or foam or anything related to filing or smoothing)</td></tr><tr><td>aiv</td><td>Miter/ Mitre square (1) (only answer)</td><td></td></tr></table> **4 x 1**	**(4)**

Question Number	Answer	Mark
11. (b) (i)	**Two** properties given from: • Hard (1) • Tough (1) • Excellent resistance to corrosion/ does not rust/ corrode in ground/ weather (1) • Durable/ long lasting (1) • Good chemical resistance (1) 2 x 1	**(2)**

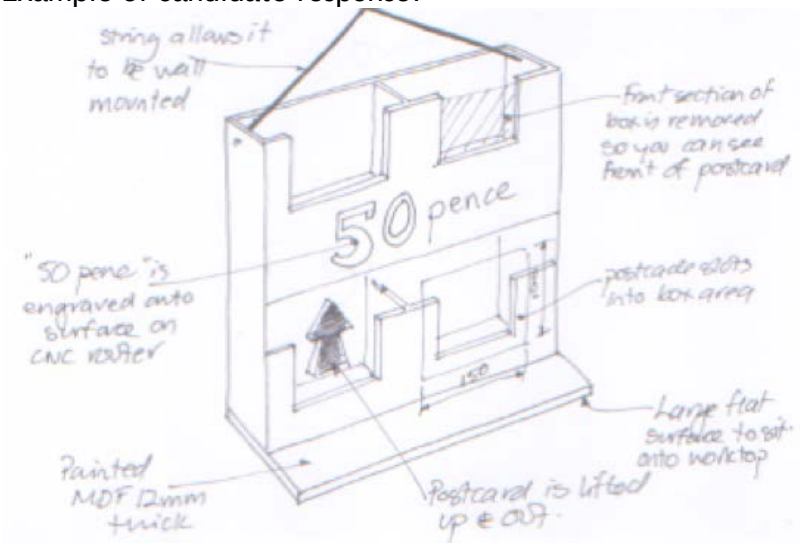
Question Number	Answer	Mark
11. (b) (ii)	**Three** risks given from: • Burning your self / clothes/ hair (1) • Damage to your eyes / arc eye (1) • Explosions (1) • Sparks causing possible fire to surrounding materials (1) • Harmful fumes/ gases given off (1) 3 x 1	**(3)**

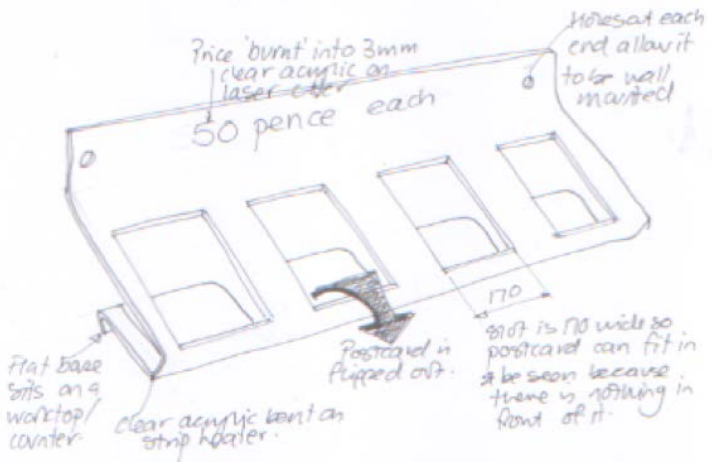
Question Number	Answer	Mark
11. (b) (iii)	**Two** descriptions from: • Very accurate (1) which reduces waste due to error (1) • Fully automated/controlled by computer (1) which reduces the need for human intervention/reduces labour costs/ risk of injury to humans (1) • Easy to repeat cut/ efficient (1) which means identical parts can be cut/consistency/ mass produced (1) • Better quality outcome (1) which will require less edge finishing (1) 2 x 1 2 x 1	**(4)**

Question Number	Answer	Mark
11. (c) (i)	Thermoplastic (1) (Only answer) 1 x 1	**(1)**

Question Number	Answer	Mark
11. (c) (ii)	Extrusion/ Extruding (1) (only answer) 1 x 1	**(1)**

Question Number	Answer	Mark
11. (d)	**Two** advantages given from: • Uses free energy from the sun/renewable energy source/ sustainable/ clean (1) which means no money has to be spent on replacement batteries/ free to run (1) • No wires are involved from power sources (1) so the lights can be easily moved around (1) • Lights charge automatically (1) which means no need to turn things on and off (1) • Small and compact (1) which means they do not take up too much space in the light (1) • Portability (1) allowing the light to be moved around the garden (1) • No depletion of fossil fuels/ pollution created/ environmentally friendly (1) which would be burnt to create energy (1) 2 x 1 2 x 1	**(4)**

Question Number	Answer	Mark
12.	**Design idea 1** Candidates may answer any specification point in either graphical form or by annotation. **No marks are awarded for the quality of graphical communication.** • 1. allow for the front of picture postcard to be seen (1) e.g. open front / behind see through screen/cover • 2. allow for the picture postcard to be easily removed (1) e.g. lifted up / slid out / finger holes / cut outs • 3. hold four different picture postcards (1) e.g. drawers / side by side / 2 x 2 matrix / pockets • 4. sit flat on a surface (1) e.g. flat surface / tripod / folded frame / feet • 5. be capable of being mounted on a wall (1) e.g. hole / string / mirror plate • 6. use an appropriate method to display a selling price (e.g. 50p/€1) (1) e.g. engraved / vinyl / paint / etch/ stickers • 7. be made from material available in the school workshop e.g. specific name material • 8. be manufactured using processes available in a school workshop (1) e.g. specific named process that relates to the named material above Example of candidate response:  	**(8)**

	Design idea 2 Marks for design idea 2 can only be awarded where specification points are resolved differently than in design idea 1. Example of candidate response:  	**(8)**

Question Number	Answer	Mark
13. (a) (i)	**Two** properties given from: • Tough (1) • Durable (1) • Flexible / good elasticity/ bent (1) • Lightweight (1) 2 x 1	**(2)**

Question Number	Answer	Mark
13. (a) (ii)	**One** reason described from: • Ash is more flexible (1) which means it will bend/ flex in comparison to mild steel (1) • Mild steel needs a surface finish (1) and it will flake off if it gets damaged and will rust (1) • Ash is a natural material (1) meaning it is more sustainable (1) • Ash once varnished / stained (1) looks nice / more natural / good aesthetics (1) • Ash is lighter than mild steel (1) making it easier to move the chair (1) 2 x 1	**(2)**

Question Number	Answer	Mark
13. (b)	**One** reason described from: • Will make the surface waterproof (1) which will make it last longer/more durable (1) • Will improve the appearance/make it look nice (1) which will appeal to customers/chance of improving sales (1) • Will leave the material a natural colour (1) so you will be able to see the grain/figuring (1) • Adds a protective layer (1) therefore more durable against wear and tear whilst in use/ resistant to moisture/ fluids/ food spillage (1) 2 x 1	**(2)**

Question Number	Answer	Mark
13. (c) (i)	**One** reason explained from: • The legs are angled out/spread (1) which creates a taper to slide down over the seat area/ stable base (1) • It is lightweight (1) which will make it easy to lift up and onto another one (1) • The legs will slide / go over the seat (1) which means one will sit on another (1) • The shape of the seat/ all the same size (1) will fit nicely on top of the one below (1) • Handle is included (1) so easily lifted (1) Do not accept any repeat of the question stem. 2 x 1	**(2)**

Question Number	Answer	Mark
13. (c) (ii)	**One** reason explained from: • Lightweight frame/structure (1) which makes it easy to carry / lift up (1) • There is a cut out section/ handle shape (1) which means you can get your hand in to lift it up (1) Do not accept any repeat of the question stem. 2 x 1	**(2)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>13. (d)
QWC</td><td>
Evaluation to address the following issues:
Form
Why is the product shaped/styled as it is?
<table>
<tr><th>Chair A</th><th>Chair B</th></tr>
<tr><td>• Easier to stack when in shops / restaurants / homes
• Curved shape will support your back
• Back rest will allow you to lean back
• Legs spread out wide on floor to create a stable base
• Uses minimal materials which will help reduce environmental impact
• Cut out section on back means it is easy to grab and lift
• Lower to the ground as conventional dining room tables are lower
• Curved shape is aesthetically appealing to some users</td><td>• Taller since it is a bar stool and bars are generally higher than normal tables
• Foot rest for feet to rest on since they would not touch the ground when sat on one of these stool
• Seat only and no back rest as you would lean in towards the bar and not backwards
• Tall and narrow so they reach the bar and do not take up too much space from side to side</td></tr>
</table>
User requirements
What makes the product attractive to potential users?
<table>
<tr><th>Chair A</th><th>Chair B</th></tr>
<tr><td>• Easily stacked
• Lightweight and quite minimalist
• Easy to pick up and move
• Natural materials are an attractive/appealing finish</td><td>• Able to adjust the height for different users at the same bar
• Can swivel round from side to side so that you can talk to people either side of you</td></tr>
</table>
</td><td>(6)</td></tr>
</table>

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-2	Candidate identifies the area(s) of comparison with no development OR identifies and develops one area. Shows limited understanding of the comparison. Writing communicates ideas using everyday language but the response lacks clarity and organisation. The candidate spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3-4	Candidate identifies some areas of comparison with associated developments showing some understanding of the comparison. Writing communicates ideas using D&T terms accurately and showing some direction and control in the organising of material. The candidate uses some of the rules of grammar appropriately and spells and punctuates with some accuracy, although some spelling errors may still be found.
Level 3	5-6	Candidate identifies a range of areas of comparison with associated developments showing a detailed understanding of the comparison. Writing communicates ideas effectively, using a range of appropriately selected D&T terms and organising information clearly and coherently. The candidate spells, punctuates and uses the rules of grammar with considerable accuracy.

Question Number	Answer	Mark
14. (a)	**Two** finishes from: • Paint (1) • Lacquer (1) • Plastic dip coat (1) • Powder coating (1) • Anodised (1) • Polished (1) • Brushed (1) (Only accept one form of paint; gloss / spray / Hammerite) 2 x 1	**(2)**

Question Number	Answer	Mark
14.(b)	Three processes given: A. Facing/ off (1) B. Parallel turning (1) C. Knurling (1) (Only answers) 3 x 1	**(3)**

Question Number	Answer	Mark
14. (c) (i)	One description from: • Easy to remove (1) to leave a cavity (1) • A flat surface is required to start with (1) so that you can turn over the packed box (1) • There is a shape/profile/symmetrical component (1) which cannot be achieved by a single pattern (1) • The pattern/ mould can be reused (1) for batch/mass production (1) 2x1	**(2)**

Question Number	Answer	Mark
14. (c) (ii)	One description from: • When metal appears at the top of the riser (1) it means that the cavity is full (1) • The molten metal is poured into the runner (1) and the air escapes/leaves the riser (1) • As the metal cools/contracts (1) the riser feeds the cavity (1) 2x1 (Do not accept responses where runner/ riser are wrong way around)	**(2)**

Question Number	Answer	Mark
14. (d)	**Two** disadvantages described from: • It uses a great deal of energy/produces a lot of heat (1) which makes it environmentally costly (1) • New sand has to be packed each time a new casting takes place (1) which makes it quite a time consuming process (1) • Extra machining often needs to happen / fettling (1) which adds to the overall cost / expense (1) • An accurate pattern/mould needs to be made (1) which is expensive/requires highly skilled workers (1) • It is quite a dangerous process/ expensive to run (1) because of the temperatures/molten metal involved (1) • If not tightly packed (1) the whole thing can fall apart/ break when moving/ turning over/ removing mould 2 x 1 2 x 1	**(4)**

Question Number	Answer	Mark
14. (e) **QWC**	Indicative content **Discussion to address the following issues:** (must address **both** materials and energy to score full marks) • Companies can use more efficient manufacturing machinery because they will use less energy • Fewer components will also reduce the overall amount of material consumption • Factories can turn lights off at night/ machines turned off • The factory could make better use of renewable energy sources for generating power / heating water • Overall packaging could be reduced in terms of both sending and receiving materials or components • They could use heat recovery systems from the furnace so that heat is reused to heat the factory • They could use any waste that can be burnt to generate heat / biomass • Any scrap from the runners and risers/ recycled aluminium can be reused when making more weights • Using a JIT manufacturing model	**(6)**