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Mark Scheme (Results)

June 2011

GCSE Design & Technology: Resistant Materials
(5RM02/01: Knowledge and Understanding of Resistant Materials)

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June 2011
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Question Number	Answer	Mark
1	C	**(1)**

Question Number	Answer	Mark
2	D	**(1)**

Question Number	Answer	Mark
3	A	**(1)**

Question Number	Answer	Mark
4	D	**(1)**

Question Number	Answer	Mark
5	B	**(1)**

Question Number	Answer	Mark
6	A	**(1)**

Question Number	Answer	Mark
7	C	**(1)**

Question Number	Answer	Mark
8	D	**(1)**

Question Number	Answer	Mark
9	A	**(1)**

Question Number	Answer	Mark
10	B	**(1)**

Question Number	Answer	Mark
11(a)	<table><tr><td></td><td>Sawing / cutting a screw thread /threading **(1)**</td></tr><tr><td></td><td>Cutting straight lines in metal / plastic / materials (not wood) **(1)**</td></tr><tr><td>Knock down / KD fitting / joint block / modesty blocks (Only answers) **(1)**</td><td></td></tr><tr><td>Micrometer (Only answers) **(1)**</td><td></td></tr></table> **4x1**	**(4)**

Question Number	Answer	Mark
11(b)(i)	**Two** properties named from: • Tough/toughness **(1)** • Ductile/ductility **(1)** • Good tensile strength **(1)** • Hard/hardness **(1)** • Malleable/malleability/easily bent/shaped **(1)** • Fluidity **(1)** • Compressive strength **(1)** • Durable **(1)** *(Do not accept strong / strength on its own)* **2x1**	**(2)**

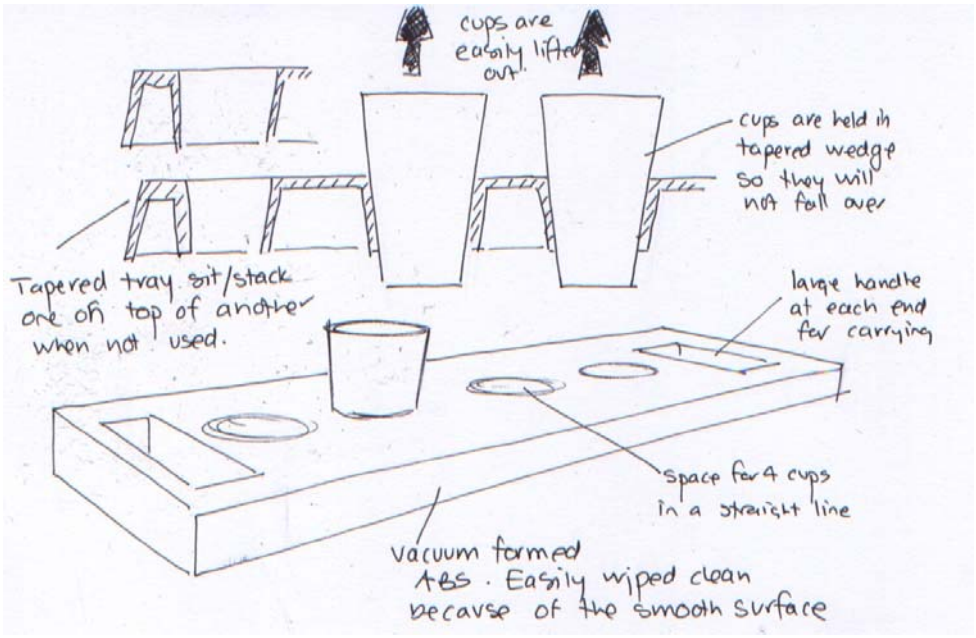
Question Number	Answer	Mark
11(b)(ii)	**Two** reasons given from: • Improve appearance / make it look better / nice **(1)** • Stop it from rusting / improve performance **(1)** • Make it last longer / more durable **(1)** *(Do not accept general comments about a good quality finish)* **2x1**	**(2)**

Question Number	Answer	Mark
11(b)(iii)	**Three** finishes given from: • Plating **(1)** • Paint/Hammerite **(1)** • Plastic dip coating **(1)** • Powder coating **(1)** • Galvanising **(1)** *(Only acceptable answers)* **3x1**	**(3)**

Question Number	Answer	Mark
11(b)(iv)	**Two** explanations given from: • Mild steel is cheaper than aluminium **(1)** which means the whole bench will cost less / be more profitable **(1)** • Mild steel has a higher compressive strength than aluminium **(1)** which means smaller sections can be used / which means the bench will be able to withstand greater weights / forces **(1)** • Mild steel is harder / tougher **(1)** which means it will not dent / break as easily **(1)** • Mild steel is easier to weld / join **(1)** which means cheaper production **(1)** *(Do not accept not as strong unless qualified)* **2x1** **2x1**	**(4)**

Question Number	Answer	Mark
11(b)(v)	**Two** effects described from: • Less material sent to landfill **(1)** which means that sites will last longer/not fill up as quickly **(1)** • Less mining will be required **(1)** to find iron ore in order to make new steel / protects the landscape/environment **(1)** • Less energy is required **(1)** than to produce new material **(1)** • Less resources required **(1)** so natural resources last longer **(1)** • Less pollution **(1)** from digging/mining materials **(1)** **2x1** **2x1**	**(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 - identify how the 4 cups are held e.g. held in tray / container / box 2 - stop them from falling over e.g. tapered holes / height at which they are supported / use of dimensions (minimum 60mm deep or 60mm diameter holes) 3 - be easy to carry e.g. handles / cut out recess 4 - be easy to remove the cup e.g. clearance around cup / easy access / push from below 5 - be easily wiped clean e.g. simple shape / no internal sharp corners 6 - stack when not in use e.g. ability to fit into each other / locating method / flat surface 7 - be made from materials available in a school workshop e.g. specifically named material (not wood / metal / plastic) 8 - be manufactured using processes available in a school workshop e.g. named process must be appropriate to material named Example of candidate response:	



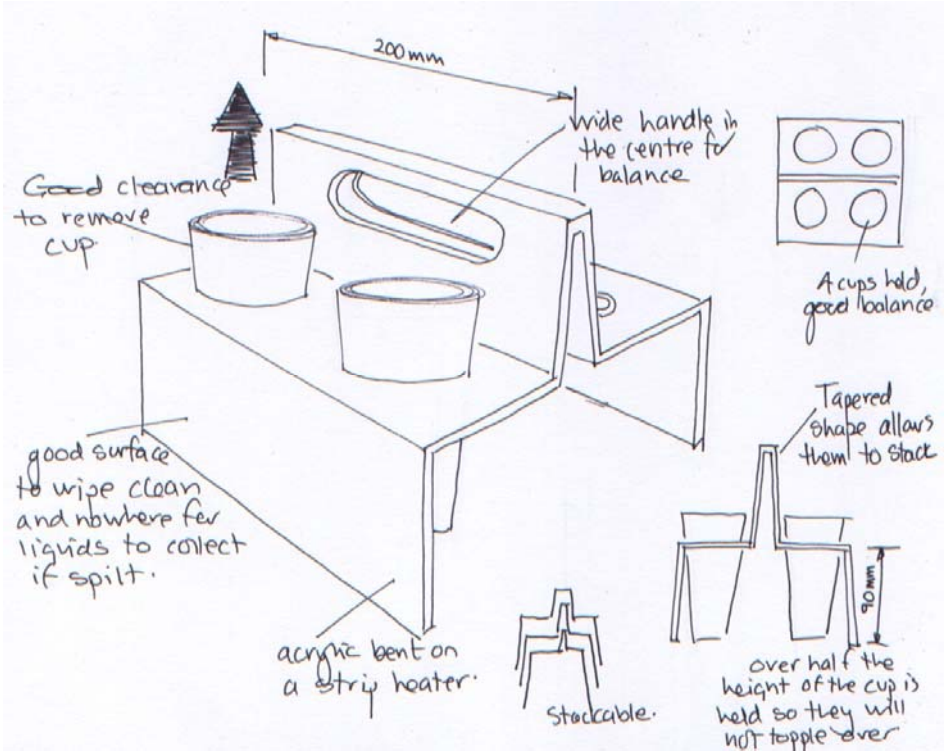
8x1

(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:



8x1

(8)

Question Number	Answer	Mark
13(a)	**Two** properties given from: • plasticity / easily shaped **(1)** • durable / durability **(1)** • waterproof **(1)** • electrical insulator **(1)** • good insulator of heat **(1)** • good resistance to corrosion / chemicals **(1)** • high impact strength / toughness **(1)** • lightweight **(1)** • scratch resistant **(1)** • Good compressive strength **(1)** *(Do not accept strong / cheap)* **2x1**	**(2)**

Question Number	Answer	Mark
13(b)	**Two** reasons described from: • complex / contoured shape **(1)** which can be achieved with a split mould **(1)** • automated process **(1)** which makes it suitable for high volume production /continuously **(1)** • variable cross section **(1)** which can be achieved by this process / mould **(1)** • no overhangs / undercut shapes **(1)** which means it can be easily released from the mould **(1)** • several can be made in one mould **(1)** making it cheaper in the long run **(1)** • no additional surface finishing is required **(1)** which means the overall production time is faster **(1)** • high tolerances can be achieved **(1)** which means the pieces will be very accurate **(1)** • it is a self-finishing process **(1)** which means no other surface treatment will be required **(1)** • identical copies **(1)** so each one is made to the same standard **(1)** *(Do not accept cheap/fast unless qualified)* **2x1**	**(4)**

Question Number	Answer	Mark
13(c)(i)	**One** reason explained from: • The shape/size of the handle **(1)** allows it to be gripped / held and the trigger to be squeezed at the same time **(1)** • A squeezing / trigger action is required **(1)** rather than a turning action which requires two hands **(1)** • The handle and trigger are close together **(1)** which means it can be gripped / squeezed easily/comfortable **(1)** **2x1**	**(2)**

Question Number	Answer	Mark
13(c)(ii)	**One** reason explained from: • The large trigger action **(1)** is converted into a cramping movement **(1)** • A mechanical advantage is gained **(1)** by the long trigger/lever **(1)** **2x1**	**(2)**

Question Number	Answer	Mark
13(d) QWC	**Evaluation to address the following issues:** **Material requirements:** How should materials perform within the product?	

Cramp A	**Cramp B**
Soft jaws which means less damage will occur to the work	Heavy and therefore more difficult to carry around
Weak shaft which could flex when a force is being applied	Metal jaws and therefore quite likely to damage the work when the force is applied
Rubber jaws can slide off due to nature of clamping action	Made from a ferrous metal which is likely to rust
	Mild steel frame needs painting to protect the surface which adds to the cost

Performance requirements:

What are the technical considerations that must be achieved within the product?

Cramp A	Cramp B
Easy to relieve the pressure quickly Can be operated with one hand Fast to adjust the gap between the two cramping heads Rubber jaws will not damage work This clamp may spring back and hurt you when you release it	Will be able to generate greater pressure Two hands are required in order to operate it Wooden blocks need to be used to prevent damage

(6)

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 student spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3 - 4	Candidate identifies some areas of comparison with associated development 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 student 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 student spells, punctuates and uses the rules of grammar with considerable accuracy.

Question Number	Answer	Mark
14(a)	Mortise and tenon (accept any reasonable spelling of each word) *(only answer but both parts required for 1 mark)*	**(1)**

Question Number	Answer	Mark
14(b)	**Two** properties and linked justification from: • **Property**: Hard / hardness **(1)** • **Justification**: which means it will withstand wear**(1)** • **Property**: Tough/toughness **(1)** • **Justification** which means it can withstand the knocks and bumps of everyday use **(1)** • **Property**: Durable/durability **(1)** • **Justification** which means it will last a long time **(1)** • **Property**: Stable / stability **(1)** • **Justification** which means it resists warping/twisting **(1)** • **Property:** Visually attractive/nice grain/colour**(1)** • **Justification:** which means it will appeal to users / consumers **(1)** *(Do not accept strong / cheap / easy to work)* **2 x 1** **2 x 1**	**(4)**

Question Number	Answer	Mark
14(c)	**Two** reasons given from: • MDF is available in large sections **(1)** which means not having to join smaller planks together **(1)** • More dimensionally stable **(1)** which means it is less likely to warp / twist / cup **(1)** • Cheaper than solid oak **(1)** which means the table will cost less **(1)** • It results in more economical use of natural timbers **(1)** which means that what natural timber we do have will last longer **(1)** **2 x 1** **2 x 1**	**(4)**

Question Number	Answer	Mark
14(d)	**Two** advantages described from: • Less travel required **(1)** so time can be saved / fuel saved / emissions reduced **(1)** • Cheaper **(1)** because no travel expenses will be incurred **(1)** • Lots of people can be involved **(1)** which means decisions can be taken by all parties involved in the project **(1)** • Time can be saved in the overall design and manufacture **(1)** because discussion can take place live and decisions made **(1)** **2 x 1** **2 x 1**	**(4)**

Question Number	Answer	Mark
14(e) QWC	Indicative content **Discussion to address the following issues:** • Reduce packaging of materials which will reduce the amount that needs to be thrown out • Use biodegradable packaging materials which will break down quicker / will reduce the amount of space required in landfill • Use recycled materials / better for the environment • Make sure standard size boards and material sections are used • Any off cuts can be used for smaller other parts / new products • Waste can be burned to provide heat for the factory • Good lay planning to ensure effective use of material • Reduce section sizes / use standard sizes / keep sections square • Accuracy of marking out and cutting *(Do not accept anything related to recycling of the Furniture)*	**(6)**

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 student spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3 - 4	Candidate identifies some areas of comparison with associated development 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 student 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 student spells, punctuates and uses the rules of grammar with considerable accuracy.

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