

Mark Scheme (Results)

Summer 2012

GCSE Design and Technology
Resistant Materials (5RM02)

Paper 01 Knowledge and
Understanding of Resistant Materials

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Summer 2012

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Question Number	Answer	Mark
1	B	(1)
Question Number	Answer	Mark
2	A	(1)
Question Number	Answer	Mark
3	C	(1)
Question Number	Answer	Mark
4	D	(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	B	(1)
Question Number	Answer	Mark
10	A	(1)

Question Number	Answer	Mark
11. (a)	<p>Use</p> <ul style="list-style-type: none"> Protecting/keeping your clothes clean Prevent clothes getting caught (1) Holding tools in pockets Keeping your tie tucked in / behind <p>Do not accept anything related to 'protecting your body'</p> <p>(1)</p>	
	<p>Use</p> <ul style="list-style-type: none"> Removing waste/wood Cutting out joints/holes/hinge recess Wasting/shaping/carving/chipping /tidying/ cleaning/wood/material (only answers) <p>Do not accept any answer relating to 'metal'</p> <p>(1)</p>	
	<p>Name</p> <ul style="list-style-type: none"> Pillar drill / drilling machine Pedestal drill (only answers) <p>(1)</p>	
	<p>Name</p> <ul style="list-style-type: none"> Mortise gauge (only answer) <p>(1)</p>	
		(4)

Question Number	Answer	Mark
11. (b) (i)	<p>Three properties given from:</p> <ul style="list-style-type: none"> Good chemical resistance (1) Lightweight (1) Water resistant / waterproof (1) Tough (1) Durable (1) Good electrical insulator (1) Plasticity / easily moulded into shape/reshaped (1) Flexible/squeezable/elasticity (1) <p>Do not accept 'strong'/'cheap'/'malleable'</p> <p>1 x 1 1 x 1 1 x 1</p>	(3)

Question Number	Answer	Mark
11.(b) (ii)	<p>One disadvantage given from:</p> <ul style="list-style-type: none"> • Dangerous fumes given off when burnt (1) • Expensive / difficult to recycle (1) • Requires oil based products to make it (1) • Not biodegradable / decomposable (1) • Could end up in landfill (1) <p>Do not accept 'expensive' on its own</p> <p style="text-align: right;">1 x 1</p>	(1)

Question Number	Answer	Mark
11.(b) (iii)	<p>Two advantages described from:</p> <ul style="list-style-type: none"> • A hollow product (1) is easier/simpler to form (1) • The mould is less complex (1) because it does not require a core to make a hollow product (1) • The cross sectional area of wall thickness (1) is easier to control without the addition of a core (1) <p>Do not accept anything related to 'cheaper' / 'quicker'</p> <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
11. (c)	<p>Three ways given from:</p> <ul style="list-style-type: none"> • Reduce material and energy (1) • Reuse materials and products where applicable (1) • Recover energy from manufacturing processes (1) • Recycle materials (1) • Eliminate error (1) <p style="text-align: right;">1 x 1 1 x 1 1 x 1</p>	(3)

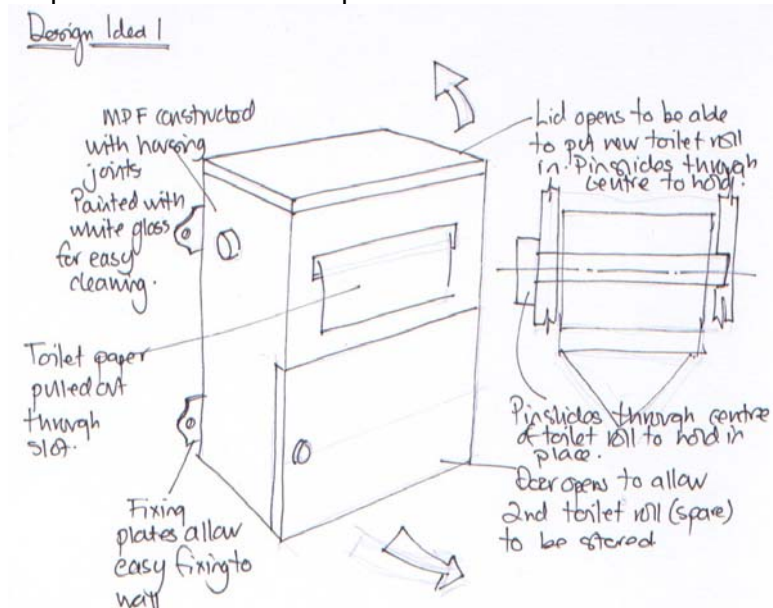
Question Number	Answer	Mark
11. (d)	<p>Two ways described from:</p> <ul style="list-style-type: none"> • Wind turbines/solar cells/photovoltaic cells (1) used to provide electricity (1) • Solar panels (1) used to heat water for washrooms/generate power (1) • Geothermal/ground source heat (1) used to provide heating (1) • Biomass (1) used in biofuels for transportation/burnt for heating (1) • Tidal/wave/hydroelectric (1) used to generate electricity/power (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
12.	<p>Design idea 1</p> <p>Candidates may answer any specification point in either graphical form or by annotation.</p> <p>No marks are awarded for the quality of graphical communication.</p> <ul style="list-style-type: none"> • hold one toilet roll for easy use (1) e.g. on a pole / pegs from each end/less than diameter 50mm (if no toilet roll shown, dimensions must be in evidence) • provide storage space for a spare roll (1) e.g. in a cupboard / drawer/use of dimensions • allow the toilet roll paper to be unrolled (1) e.g. pulled off / pulled with weight on top/control of dispensing/slots/guide • allow for the toilet paper roll to be replaced once empty (1) e.g. pole is removed/on a spring loaded system/peg slides out • be easily fixed to a wall (1) e.g. screwed direct/fixing plates/keyhole plates/suction pads/sticky pads/glue • be easily cleaned (1) e.g. smooth shape / materials / surface finish/ internal corners radiused 	

- be made from materials available in a school workshop (1)
e.g. specific named material oak, acrylic (do not accept wood/metal/plastics)
- be manufactured using processes available in a school workshop (1)

Do not accept 'injection moulding/blow moulding'

Example of candidate response:



8 x 1

(8)

Design idea 2

Marks for design idea 2 can only be awarded where specification points are resolved differently than in design idea 1.

	<p>Example of candidate response:</p>	(8)
8 x 1		

Question Number	Answer	Mark
13. (a)	<p>Two properties given from:</p> <ul style="list-style-type: none"> • Tough (1) • Ductile (1) • Malleable (1) • Hard (1) • Good compressive strength (1) <p>(only answers)</p> <p style="text-align: right;">1 x 1 1 x 1</p>	(2)

Question Number	Answer	Mark
13. (b)	<p>Two reasons described from:</p> <ul style="list-style-type: none"> • steel will rust (1) therefore zinc is used to provide a protective coating(1) • it is a cheap process (1) and therefore cost effective (1) • zinc provides excellent resistance to corrosion/increases durability (1) which means the dustbin will last longer (1) • Smoother surface (1) makes it easier to clean (1) • More aesthetically pleasing/shiny (1) than a rustier appearance/attract customers (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
13. (c) (i)	<p>One reason explained from:</p> <ul style="list-style-type: none"> • The lid (1) sits neatly around the top of the bin so it will not come off/let any rubbish out/overflow/fall over (1) • Large stable base (1) which means it's unlikely to fall over (1) • There are no holes in the bin (1) which means no air can blow through the bin blowing the rubbish/litter out (1) • Large internal volume (1) provides lots of space to put rubbish in (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13. (c) (ii)	<p>One reason explained from:</p> <ul style="list-style-type: none"> • The handles on each side (1) means that it is easy to get hold of / lift / balanced/pick it up (1) • The lid can be removed (1) therefore reducing the overall weight / making it lighter to lift (1) • The thin sheet/lightweight steel (1) keeps weight to a minimum (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark				
13. (d) QWC	<p>Evaluation to address the following issues:</p> <p>User requirements What qualities make the product attractive to potential users?</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Dustbin A</th> <th style="width: 50%;">Dustbin B</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • Can be difficult to lift • Smaller volume for rubbish • Lid could come off and get lost / misplaced • Can use it for burning rubbish in </td> <td> <ul style="list-style-type: none"> • Easy to move due to wheels • Able to put more rubbish in it due to size • Lid is hinged and so will not get lost • Easier for refuse collectors to </td> </tr> </tbody> </table>	Dustbin A	Dustbin B	<ul style="list-style-type: none"> • Can be difficult to lift • Smaller volume for rubbish • Lid could come off and get lost / misplaced • Can use it for burning rubbish in 	<ul style="list-style-type: none"> • Easy to move due to wheels • Able to put more rubbish in it due to size • Lid is hinged and so will not get lost • Easier for refuse collectors to 	
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	<ul style="list-style-type: none"> Handles allow two people to lift it 	<p>empty</p> <ul style="list-style-type: none"> Materials are more durable than the mild steel bin / will last longer 	
<p>Performance requirements What are the technical considerations that must be achieved within the product?</p>			
Dustbin A		Dustbin B	
<ul style="list-style-type: none"> Limited manufacturing processes involved Less accuracy required when making lid Must be finished otherwise it will rust Bin will dent easily 		<ul style="list-style-type: none"> Many manufacturing processes required Accurate fitting of parts to ensure all bits fit together well Expensive tooling costs to set up moulds Plastic will withstand knocks and bumps 	
			(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 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.
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Question Number	Answer	Mark
14. (a)	<p>One manufactured board named from:</p> <ul style="list-style-type: none"> • Plywood • Chipboard • Blockboard • Laminboard <p>(Do not accept hardboard)</p> <p style="text-align: right;">1 x 1</p>	(1)

Question Number	Answer	Mark
14. (b) i	<p>Two materials named:</p> <ul style="list-style-type: none"> • Copper • Zinc <p>(Only answers)</p> <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
14. (b) ii	<p>One property and linked justification from:</p> <ul style="list-style-type: none"> • Property: good resistance to corrosion/durable (1) • Justification: which means it will last a long time (1) • Property: good fluidity (1) • Justification which means it will cast well (1) • Property: malleable/ductile (1) • Justification can be pressed into shape (1) <p>Do not accept 'strong' / 'cheap' / 'easy to work'</p> <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
14. (c)	<p>Two reasons explained from:</p> <ul style="list-style-type: none"> • Allows them to buy large pieces of 'flat pack' furniture/in boxes (1) and to transport it/take it home in their own cars (1) • They feel a sense of achievement (1) in making their furniture/assembling it (1) 	

	<ul style="list-style-type: none"> • If they live upstairs/in a flat (1) it can be difficult to get large pieces of furniture upstairs/around tight corners (1) • It is often cheaper (1) because they do not have to pay to have it assembled by someone else (1) • Non-permanent joint/can be taken apart (1) so it can be easily moved/stored (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)
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Question Number	Answer	Mark
14. (d)	<p>Two reasons described from:</p> <ul style="list-style-type: none"> • changes can be updated easily (1) without having to redraw the whole thing (1) • ideas can be sent to others/email (1) which speeds up the whole communication process (1) • can be linked straight to CAM machines (1) which means that prototypes/products can be quickly produced once design is finalised (1) • colour / render / texture can be applied (1) which means that you can see what it looks like in different colours/finishes/gage consumer feedback (1) • full 3D virtual products can be viewed from all angles (1) so that the whole product/design can be viewed/tested (1) • ideas / designs (1) can be virtually tested (1) • accurate dimensions (1) can be achieved creating full sized / scaled / fully proportioned designs (1) • stored on hard disc/electronic format (1) which means it is easier to move around than sheets of paper/recalled/loaded when required (1) • Standard components (1) can be stored in a library (1) • Software features (1) allow easy manipulation (1) (Zoom/copy/paste/rotate/mirror etc) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
14. (e) QWC (iii)	<p>Indicative content</p> <p>Discussion to address the following issues:</p> <ul style="list-style-type: none"> • Plywood and MDF sheets can be bent to make curves rather than cutting them out of solid timber which means solid timber can be conserved • Large sheet sizes make it possible to create large surfaces rather than having to stick lots of smaller sections of solid timber together • Veneers can be used to stick onto manufactured board so as to use the natural timbers more resourcefully • Waste products and off cuts are used to make manufactured board such as MDF and chipboard/knobs/smaller items • Some manufactured boards resist bending better than natural timbers and therefore smaller sections/thicknesses can be used • Natural wood and timber should be used from managed sources so that new trees are planted as some are cut down • Cutting down of rainforest should be carefully controlled and regulated so as to make what we have last longer • Use of CAD for lay planning • Use of laser/CAM for cutting closer 	(6)

Level	Mark	Descriptor
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Level 1	1-2	Candidate identifies the issues with no development OR identifies and develops one area. Shows limited understanding of the issues. 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 issues with associated developments showing some understanding of the issues. 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

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Level 3	5-6	Candidate identifies a range of issues with associated developments showing a detailed understanding of the issues. 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.

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