

# Mark Scheme (Results)

## Summer 2010

GCSE

GCSE Design and Technology:  
Resistant Material Technology(1973)  
Paper 2H  
Higher Written Paper.

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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.

## Introduction:

### **Give / State / Name**

Normally a one or two word answer, at the very most a short sentence.

### **Describe**

Normally, one or two sentences which form a description, making reference to more than one point. All points must be linked for a complete answer.

### **Explain**

Normally, one or two sentences which form an explanation. This requires a clear or detailed account of something and includes a relevant justification, reason or example.

### **Evaluate**

Normally one or two sentences where the quality, suitability or value of something is judged. This can include both positive and negative points, with each point normally, requiring a relevant justification.

The mark scheme contains a range of possible answers for all questions. For some questions it is possible to provide a finite number of acceptable answers. However, in some instances it is not possible to provide every conceivable answer. In these instances objective guidance is provided.

For all answers candidates are not expected to give the exact wording contained in this mark scheme. However, to gain credit their answer must demonstrate the same meaning as detailed in the mark scheme.

It is the examiner's responsibility to apply their professional judgement in determining if what the candidate has written has the same meaning as the answer detailed in the mark scheme. For all answers the '*Key words*' have been written in bold text.

For describe and explain questions, candidates may give a different combination of the marking points listed in the mark scheme. In such instances candidates can be rewarded for the marking points provided that they are suitably linked. However, candidates cannot be rewarded for the same point repeated in two different combinations.

Question Number	Answer	Mark
1(a)(i)	<p><b>Three</b> each of the following:  Specification points  Reasons - Do not accept repetition of the specification points</p> <p><u>Quality</u>  Point: strong construction  Reason: carry heavy weight</p> <p>Point: smooth edges  Reason: so no injury is caused to the user</p> <p>Point: accurate fitting of the hand grip  Reason: so it does not fall off and get lost / cause injury to user on sharp end</p> <p>Point: the wheel / tyre should be well fitted  Reason: so that it does not come off and cause injury / allow for wheel to rotate</p> <p>Point: materials suitable for exterior use  Reason: longer life span / greater reliability</p> <p>Point: durable materials  Reason: so that it lasts a long time / low maintenance</p> <p style="text-align: right;">(2x1)</p>	(2)
1(a)(ii)	<p><u>Environment</u>  Point: use of recycled materials  Reason: so existing materials / resources are preserved</p> <p>Point: materials should recycled once the product has reached the end of its useful life  Reason: so that the materials may be used for something else / preserving resources</p> <p style="text-align: right;">(2x1)</p>	(2)
1(a)(iii)	<p><u>Safety</u>  Point: stable base  Reason: so it does not fall over</p> <p>Point: hand grips  Reason: so it is soft / smooth for the user to hold the end of the handle  Point: strong materials  Reason: so that they do not break / fail / collapse when moving heavy loads</p> <p>Point: finished well / no sharp edges  Reason: does not cause injury to users</p> <p style="text-align: right;">(2x1)</p> <p>Some flexibility should be given as some points may cross over descriptions.  <i>(do not accept/credit if already given in a(i))</i></p>	(2)

Question Number	Answer	Mark
1(b)	<p>Two reasons given from:</p> <ul style="list-style-type: none"> <li>• Readily available in range of sizes / shapes (1)</li> <li>• Easily machined / cut (1)</li> <li>• Can be finished in different ways / colours (1)</li> <li>• Relatively cheap (1)</li> <li>• Good compressive strength (1)</li> <li>• Can be recycled once it reaches the end of its useful life (1)</li> <li>• Lightweight in comparison to solid section (1)</li> <li>• Good strength to weight ratio (1)</li> <li>• Tough / hard / malleable / ductile (1)</li> </ul> <p><i>(Do not accept can be easily joined by welding / brazing/ strong)</i> (2x1)</p>	(2)
Question Number	Answer	Mark
1(c)	<p>Two reasons given from</p> <ul style="list-style-type: none"> <li>• Good surface finish / self finishing / no additional surface finishing required (1)</li> <li>• Suitable for mass / high volume production (1)</li> <li>• Repeatability / identical (1)</li> <li>• Many can be made in one mould (1)</li> <li>• High tolerance / very accurate (1)</li> <li>• Colours can be changed (1)</li> <li>• Unit costs are low once mould has been paid for (1)</li> <li>• Can produce a complex form (1)</li> </ul> <p><i>(Do not accept easy / quick / cheap / unless qualified)</i> (2x1)</p>	(2)

Question Number	Answer	Mark
1(d)	<p>Two properties and reasons given from:</p> <p>Property: Lightweight Reason: does not make it too heavy to lift</p> <p>Property: Toughness / high impact strength Reason: will stand up to knocks and bumps / will withstand things being dropped into it</p> <p>Property: Plasticity / easily moulded Reason: so it can be easily injection moulded / blow moulded / plug and yoke moulded / formed</p> <p>Property: Durable / weatherproof / waterproof Reason: will withstand weathering / does not absorb water / will stand up against outside elements / lasts longer</p> <p>Property: Resistant to chemicals / corrosion Reason: Any cement / building materials / compost / fertilizers will not cause any damage to the surface</p> <p><i>(Do not accept strong/anything relating to electrical insulating properties)</i></p> <p style="text-align: right;">(2x1) (2x1)</p>	(4)
Question Number	Answer	Mark
1(e)	<p>One reason explained from:</p> <ul style="list-style-type: none"> <li>• To make sure that items are correct size / dimensionally accurate / within tolerances (1) so that they will all fit together (1)</li> <li>• To check that the item has been correctly assembled (1) so that it does not fall apart / collapse which might cause an injury to the user (1)</li> <li>• To ensure colour match (1) so that it meets corporate image/branding/spec (1)</li> </ul> <p><i>(Do not accept anything related to quality in a generic sense)</i></p> <p style="text-align: right;">(2x1)</p>	(2)

Question Number	Answer	Mark
1(f)	<p>One explanation from:</p> <ul style="list-style-type: none"> <li>Improves aesthetic appeal (1) <b>which will</b> attract users / purchaser (1)</li> <li>Protective layer (1) <b>which means</b> that it will not rust / corrode / last longer (1)</li> </ul> <p>(2x1)</p>	(2)
1(g)(i)	<p>Carry heavy loads</p> <p>One explanation from:</p> <ul style="list-style-type: none"> <li>The two large handles increases the mechanical advantage / leverage (1) <b>which is</b> makes it easier (1)</li> <li>the shape of the tray (1) <b>means that</b> a larger volume / load can be carried (1)</li> <li>the tough / durable tray (1) is supported by a frame / structure (1)</li> </ul> <p>(2x1)</p>	(2)
1(g)(ii)	<p>Go over rough, wet ground</p> <p>One explanation from:</p> <ul style="list-style-type: none"> <li>It has a big tyre / wheel / pneumatic inner tube / inflatable tyre (1) <b>which means</b> it take / absorb the shock of bumps and bricks / stones / spreads the load (1)</li> <li>The large surface area of the tyre (1) <b>means it</b> is less likely to sink / stick in wet mud / wet conditions (1)</li> <li>It only has one wheel (1) <b>which prevents</b> grounding/ bottoming out (1)</li> </ul> <p>(2x1)</p>	(2)
<b>Total for question 1</b>		<b>22 marks</b>



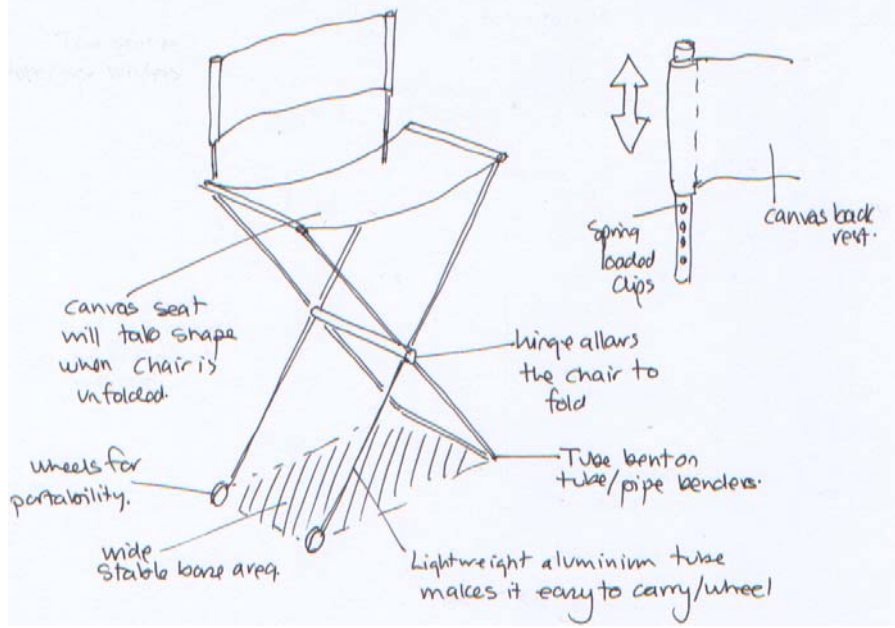
Question Number	Answer	Mark
Q02a	<p>Three risks given from:</p> <ul style="list-style-type: none"> <li>• Burns to your self / others (1)</li> <li>• Fire (1)</li> <li>• Explosion (1)</li> <li>• Arc eye /damage to eyes (1)</li> <li>• Fumes (1)</li> </ul> <p style="text-align: right;">(3x1)</p>	(3)
Q02b	<ol style="list-style-type: none"> <li>1. Remove dust with /tack cloth / damp cloth / brush (1)</li> <li>2. Apply varnish (1)</li> <li>3. Rub down with smooth glass paper (1)</li> <li>4. Apply a second coat (1)</li> </ol> <p style="text-align: right;">(4x1)</p> <p><i>(1 mark for correct sequence if all answers given)</i></p>	(5)
Q02c	<p>One finish from:</p> <ul style="list-style-type: none"> <li>• Wax (1)</li> <li>• Stain (1)</li> <li>• Polish / shellac (1)</li> <li>• Cellulose (1)</li> <li>• Oil (1)</li> </ul> <p style="text-align: right;">(1x1)</p> <p><i>(Do not accept paint or varnish)</i></p>	(1)

Question Number	Answer	Mark
Q02d	<p>One reason explained from:</p> <ul style="list-style-type: none"> <li>• To protect the surface /scratches (1) <b>so that</b> it does not get dirty / damaged / prolong life / stop burns / coffee / tea cup stains / spills / scratches (1)</li> <li>• To enhance / see the grain (1) <b>in order to make it</b> more attractive / appealing /shiny surface / smooth finish (1)</li> <li>• Seal the surface (1) <b>which means</b> moisture will be prevented from getting in to the wood (1)</li> <li>• To make the surface easier to wipe clean (1) <b>in order to keep it</b> clean / hygienic (1)</li> </ul> <p style="text-align: right;">(2x1)</p>	(2)
Question Number	Answer	Mark
Q02e	<p>Two reasons described from:</p> <ul style="list-style-type: none"> <li>• Cheaper to produce batches (1) <b>because</b> materials can be purchased in bulk / batches (1)</li> <li>• Less money is tied up (1) <b>if products</b> are not selling well (1)</li> <li>• Greater flexibility of machines (1) <b>therefore allows</b> a wider variety of jobs to be undertaken (1)</li> <li>• Once tooling has been set up (1) <b>further</b> batches can be produced quickly in response to customers needs / demands (1)</li> <li>• Any problems with a batch can be easily corrected / recalled (1) <b>therefore</b> not much money / material wasted (1)</li> </ul> <p style="text-align: right;">(2x1) (2x1)</p> <p><i>(Do not accept quick / easy unless qualified)</i></p>	(4)

Question Number	Answer	Mark
Q02f	<p>Three benefits given from:</p> <ul style="list-style-type: none"> <li>• Can make changes to colour / texture / shape / style (1)</li> <li>• Several designers can work on the design at the same stage (1)</li> <li>• 2D modelling (1)</li> <li>• 3D virtual products (1)</li> <li>• Ease of making changes (1)</li> <li>• Storage and retrieval of data (1)</li> <li>• Can be linked direct to CAM (1)</li> <li>• Designs can be sent via e-mail to manufacturer / for prototyping (1)</li> <li>• Libraries of standard components can be used (1)</li> <li>• Accurate measurements can be achieved (1)</li> <li>• Virtually testing before production (1)</li> </ul> <p style="text-align: right;">(3x1)</p> <p><i>(Do not accept easier / quicker unless justified)</i></p>	(3)
Number	Answer	Mark
Q02g	<p>Two ways described from:</p> <ul style="list-style-type: none"> <li>• Allows for fast and easy communication (1) <b>between</b> themselves and the retail outlets (1)</li> <li>• Barcode labelling / EPOS (1) <b>would allow them</b> to speed up service / stock control / track costing / shipping (1)</li> <li>• Databases / spreadsheets (1) <b>for</b> keeping records / sales / VAT (1)</li> <li>• Internet / websites for gathering information (1) <b>and</b> advertising new products / new retail stores (1)</li> <li>• Email (1) To send / receive orders (1)</li> <li>• Webcams (1) to carry out video conference / talk to retailers clients (1)</li> <li>• Mail merge / word applications (1) can be used to create bulk mailing (1)</li> </ul> <p style="text-align: right;">(2x1) (2x1)</p>	(4)
<b>Total for question 2</b>		<b>22 marks</b>

Question Number	Answer	Mark
Q03a	<p><b>Design Idea 1</b> Each point of the specification has two marking points.</p> <p>1 mark should be awarded for evidence of each point of the specification resolved in the design.</p> <p>When an answer does not viably answer a specification point 0 marks</p> <p>For each specification point with only one element viably satisfied 1 mark</p> <p>For each specification point with both elements viably satisfied 2 marks</p> <p>Candidates may answer any specification point in either graphical form or by annotation.</p> <p><b>No marks are awarded for the quality of communication</b></p> <p>Each specification resolved in design</p> <p>The outdoor chair must be portable and foldable</p> <ul style="list-style-type: none"> <li>• Evidence given / shown that it is portable (1) Eg. Handle / wheels</li> <li>• Evidence given / shown that it is collapsible (1) Eg. Flat pack / folding mechanism / hinges</li> </ul> <p>The outdoor chair must provide a stable seating platform to sit on</p> <ul style="list-style-type: none"> <li>• Evidence given / shown that it stable (1) Eg. Tripod base / large coverage area / adjustable feet</li> <li>• Evidence given / shown that provides a seating area (1) Eg. Pad / cushion / fold out area</li> </ul> <p>The outdoor chair must have a backrest which is adjustable</p> <ul style="list-style-type: none"> <li>• Evidence given / shown that it has a backrest (1) Eg. Built in canvas strap / lean on</li> <li>• Evidence given / shown that it is adjustable (1) Eg. Screw / spring loaded mechanism / thumb screw</li> </ul> <p>The outdoor chair must be made using materials and processes suitable for batch production</p> <ul style="list-style-type: none"> <li>• Specific material named (1)</li> <li>• Process given (1) Eg. tools / process / machinery</li> </ul>	(8)

Design Idea 1



## Design Idea 2

To score a mark for Design Idea 2, each specification point must be resolved in second design idea but the second design idea **must be technically / conceptually different in design and construction** from the first and not a simple variation on a theme to score the mark. Use exactly the same criteria as design idea 1 to mark design idea

A different method of being portable (1)

A different method of folding (1)

A different method of providing a stable base (1)

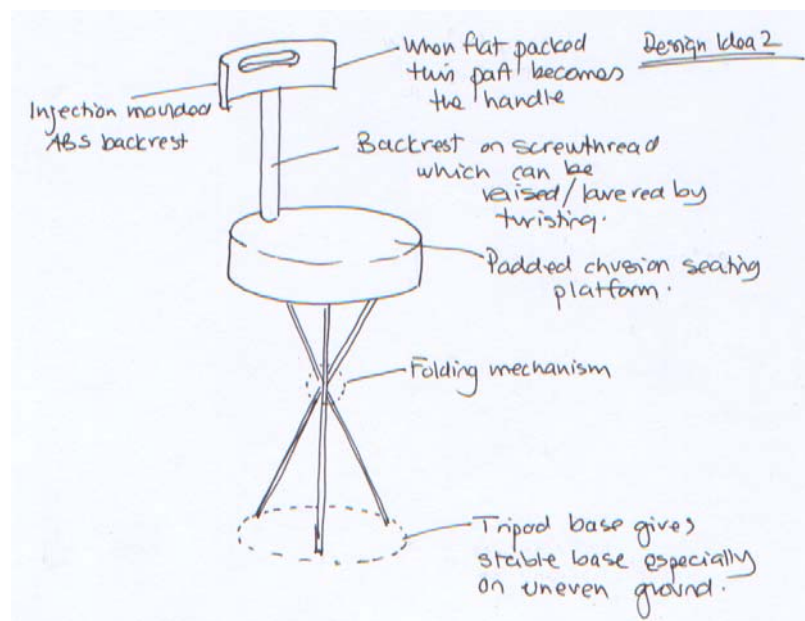
A different platform to sit on (1)

A different method of providing a backrest (1)

A different method of adjusting (1)

A different specific material named (1)

A different suitable process (1)



(8)

Question Number	Answer	Mark
3 (b)	<p>Each point clearly evaluated.</p> <p>If a candidate has indicated design idea 1 and then evaluates design idea 2 for all or part of (i), (ii) or (iii) then the idea in greater evidence should be marked.</p> <p>The evaluation of the design must contain reference to either positive or negative aspects not simply just a description of the design.</p> <p>Award 1 mark for a correct evaluation / justification relating to each design feature and how it succeeds or fails. Repetition of original spec scores 0.</p>	
3 (b) (i)	<p>(i) The outdoor chair must <b>be portable and foldable</b></p> <ul style="list-style-type: none"> <li>• How is it portable (not a reference to lightweight)</li> <li>• How is it foldable / dismantled</li> </ul> <p style="text-align: right;">(2x1)</p>	(2)
3 (b) (ii)	<p>(ii) The outdoor chair must <b>provide a stable seating platform to sit on</b></p> <ul style="list-style-type: none"> <li>• How stable is it</li> <li>• How does it provide a seating area</li> </ul> <p style="text-align: right;">(2x1)</p>	(2)
3 (b) (iii)	<p>(iii) The outdoor chair must have a <b>backrest which is adjustable</b></p> <ul style="list-style-type: none"> <li>• How does the backrest work</li> <li>• How it is adjustable</li> </ul> <p style="text-align: right;">(2x1)</p>	(2)
<b>Total for question 3</b>		<b>22 marks</b>

Question Number	Answer	Mark
4 (a)	<p>Two properties given and a reason from:</p> <p>Property: Ductile Reason: can be drawn / stretched</p> <p>Property: Tough / toughness Reason: can take small knocks / absorb some impact</p> <p>Property: Hard Reason: so that it can withstand abrasion / indentation</p> <p>Property: Malleable Reason: can be cold pressed / formed into shape</p> <p>Property: electrical conductor Reason: so it can be charged to make painting easier</p> <p style="text-align: right;">(2x1) (2x1)</p> <p><i>(Do not accept strong)</i></p>	(4)
Question Number	Answer	Mark
4 (b)	<p>Three working characteristics given from:</p> <ul style="list-style-type: none"> <li>• Easily joined / welded</li> <li>• Can be recycled</li> <li>• They contain iron</li> <li>• Easily worked / pressed / folded</li> <li>• Good tensile strength</li> <li>• They will rust if surface is left exposed to the air</li> <li>• Can be alloyed to improve their properties such as hardness / resistance to corrosion</li> <li>• Magnetic</li> <li>• Can be finished in various ways / sprayed / dip coated</li> <li>• Can be heat treated</li> </ul> <p style="text-align: right;">(3x1)</p> <p><i>(Do not accept any answers relating to non ferrous metals)</i></p>	(3)



Question Number	Answer	Mark
Q04c	<p>One disadvantage explained from:</p> <ul style="list-style-type: none"> <li>• It is more expensive (1) <b>and therefore</b> would increase the price / make the car cost more / reduce profit (1)</li> <li>• It is less tough /softer /malleable (1) <b>and therefore</b> it is more likely to bend / flex / crumple if the car were to be involved in RTA (1)</li> <li>• It is more difficult to join to other materials (1) <b>and would therefore</b> cause difficulties when it comes to fixing it to the frame (1)</li> </ul> <p style="text-align: right;">(2x1)</p>	(2)
Question Number	Answer	Mark
Q04d	<p>One reason explained from:</p> <ul style="list-style-type: none"> <li>• They are lighter than steel / aluminium (1) <b>therefore</b> the cars can go faster / quicker (1)</li> <li>• They are tougher / stronger than steel / aluminium (1) <b>and will therefore</b> protect the driver better if they crash (1)</li> <li>• Can be moulded / formed in complex shapes / profiles (1) <b>therefore</b> shapes can be much more aerodynamic (1)</li> </ul> <p style="text-align: right;">(2x1)</p>	(2)
Question Number	Answer	Mark
Q04e	<p>Three benefits given from:</p> <ul style="list-style-type: none"> <li>• Less demand on resources (1)</li> <li>• Reduced amount of waste being dumped into landfill sites (1)</li> <li>• Less pollution caused / created in the production of new materials (1)</li> <li>• Less waste having to be incinerated and so less pollution / fumes created (1)</li> <li>• Less energy used in creating / extracting new materials (1)</li> </ul> <p style="text-align: right;">(3x1)</p>	(3)

Question Number	Answer	Mark
Q04f	<p>Two benefits described from:</p> <ul style="list-style-type: none"> <li>• Less fumes / emissions (1) <b>which means</b> less pollution / CO2 produced (1)</li> <li>• Less petrol (1) <b>required therefore</b> current supplies will last longer / reduced production (1)</li> <li>• Less fuel carried in cars / lighter load (1) <b>therefore</b> less fuel consumption (1)</li> <li>• Less transportation of bulk fuel (1) <b>therefore</b> less traffic (1)</li> </ul> <p style="text-align: right;">(2x1) (2x1)</p>	(4)
Question Number	Answer	Mark
Q04g	<p>Two reasons explained from:</p> <ul style="list-style-type: none"> <li>• Need to be continually serviced (1) <b>so that manufacturers / companies</b> continue to make money (1)</li> <li>• As parts break / wear out the replacement / spare parts (1) <b>continue to generate sales / revenue</b> (1)</li> <li>• Continued demand means that the manufacturers / companies can retain staff (1) <b>which means that</b> they create wealth / jobs / employment for local people (1)</li> </ul> <p style="text-align: right;">(2x1) (2x1)</p>	(4)
<b>Total for question 4</b>		<b>22 marks</b>
<b>TOTAL FOR PAPER: 88 MARKS</b>		

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