



**2012 Product Design**

**Higher**

**Finalised Marking Instructions**

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**Higher Product Design Paper 2012  
MARKING SCHEME**

<b>Section A</b>		
<b>Question 1</b>	<b>Answer Scheme</b>	<b>Marks</b>
(a)	<p>The coat rack must:</p> <ul style="list-style-type: none"> <li>• provide appropriate storage</li> <li>• be accessible to the target users</li> <li>• be capable of being securely fixed to the wall [CSU]</li> <li>• be easily moved [MCT] – do not accept portable</li> <li>• be manufactured from <b>durable</b> materials that are suitable and appropriate for its function</li> <li>• lifespan issues (eg methods of construction)</li> <li>• be priced to suit the intended target market</li> <li>• ensure aesthetics suit the market niche or consumer aspirations</li> <li>• production costs significantly less than selling price</li> <li>• be produced in a variety of colours to give target market a wider choice</li> <li>• be easy to clean/maintain</li> <li>• conform to appropriate safety regulations</li> <li>• any other suitable statement.</li> </ul> <p><b>Six statements @ 1 mark each</b></p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Comments Accept  Suitability (MCT) </div>	<b>6</b>
(b)	<p>Statements which identify issues such as:</p> <ul style="list-style-type: none"> <li>• durability of material. (<i>non corrosion</i>)</li> <li>• readily available materials. (eg standard forms of supply)</li> <li>• strength to weight issues.</li> <li>• safety</li> <li>• suitability for production methods</li> <li>• function of component parts</li> <li>• aesthetic properties</li> <li>• ease of clean/hygiene</li> <li>• re-cycling. (metal components only)</li> <li>• any other suitable statement.</li> </ul> <p><b>Six valid statements @ 1 mark each. (5+1)</b>  <b>NB</b>    <b>Mention of mass production can be awarded in 1b only.</b>  <b>No repetition of identified issues.</b>  <b>No marks for scratch resistance (in stem).</b></p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Comments Accept  Hope – impact resistance </div>	<b>6</b>

Question 1	Answer Scheme	Marks
(c)	<ul style="list-style-type: none"> <li>• Justification of the types or manufacturing processes used in the production of the illustrated products and how production processes relate to the materials used.  MCT – Spindle moulding, machine router, bending &amp; forming, extrusion, CNC  CSU – Injection moulding, Blow moulding, Extrusion.</li> <li>• How manufacturing/assembly techniques are influenced by volume of production.</li> </ul> <p>Statement could include:  <i>Standardisation of components/sizes, component parts all the same size. No further finishing required. Process related to shape of component. Repeatability and accuracy. Economies of scale. JIT.</i></p> <p><b>Any six relevant issues about materials, processes and their relationships regarding suitability. (5+1)</b>  <b>NB No marks awarded for identification of process.</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	6
(d)	<p>Any four identified issues described:</p> <ul style="list-style-type: none"> <li>• Items safely stored.</li> <li>• Durability to withstand continual use.</li> <li>• Stability of free-standing units.</li> <li>• Easy to clean/hygienic.</li> <li>• Easy to use.</li> <li>• Safety aspects of function. (eg accessibility)</li> <li>• Safety aspects relating to production. (eg noise, dust, safety equipment)</li> <li>• Maintenance issues.</li> <li>• Any other acceptable issue.</li> </ul> <p><b>Four issues identified, 4 issues @ 1 mark each (3+1)</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	4

Question 1	Answer Scheme	Marks
(e)	<p>Explain any identified functional aspect from:</p> <ul style="list-style-type: none"> <li>• storage</li> <li>• accessibility</li> <li>• space saving</li> <li>• ease of assembly/fixing</li> <li>• mobility [MCT]</li> <li>• stability</li> <li>• durability.</li> </ul> <p>Any identified niche market from:</p> <ul style="list-style-type: none"> <li>• Nursery school</li> <li>• Primary school</li> </ul> <ul style="list-style-type: none"> <li>• Any other acceptable issue.</li> </ul> <p><b>Four issues @ 1 mark each (3+1)</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	<b>4</b>
(f)	<p>Explain any four issues from:</p> <ul style="list-style-type: none"> <li>• anthropometrics relating to adult and child users</li> <li>• finger traps</li> <li>• surface texture to prevent slipping</li> <li>• Weight for moving/strength issues</li> <li>• colour – aesthetic appeal</li> <li>• comfort</li> <li>• access for cleaning/maintenance</li> <li>• security</li> <li>• any other relevant answer.</li> </ul> <p><b>Four statements @ 1 mark each (3+1)</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	<b>4</b>
<b>Total for Section A</b>		<b>30</b>

Question 2	Answer Scheme	Marks
(a)	<p>Suitable material</p> <ul style="list-style-type: none"> <li>• High Density Polyethylene.</li> <li>• Low Density Polyethylene.</li> <li>• Polypropylene.</li> <li>• PVC.</li> <li>• Polyethylene terephthalate. (<i>PET</i>)</li> <li>• Or other suitable material.</li> </ul> <p><b>1 mark for suitable material</b></p> <p>Reason</p> <ul style="list-style-type: none"> <li>• Easy to mould.</li> <li>• Durability.</li> <li>• Easy to clean.</li> <li>• Chemical resistance.</li> <li>• Any other acceptable answer.</li> </ul> <p><b>1 mark for appropriate reason</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;">Comments Accept</div>	<b>2</b>
(b)	<p><b>1 mark each feature identified:</b></p> <ul style="list-style-type: none"> <li>• Hollow part.</li> <li>• Split lines.</li> <li>• Ejection mark.</li> <li>• Good external surface detail.</li> <li>• Visual signs of parison crimping.</li> </ul> <p><b>1 mark each 2@1</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;">Comments Accept</div>	<b>2</b>
(c)	<p>Product needs to be lightweight.</p> <p><b>1 mark</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;">Comments Accept</div>	<b>1</b>
<b>Total</b>		<b>5</b>

	<b>Section B</b>	
<b>Question 3</b>	<b>Answer Scheme</b>	<b>Marks</b>
(a)	<p><b>Scale Models</b></p> <p>Used to quickly communicate ideas/concepts without giving too much detail.</p> <ul style="list-style-type: none"> <li>• Checking ergonomic aspects.</li> <li>• Developing concept ideas.</li> <li>• Developing aesthetic aspects.</li> <li>• Aspects of testing.</li> <li>• Feedback to client.</li> <li>• Any other acceptable answer.</li> </ul> <p><b>Test Models</b></p> <p>Used when determining functionality to allow accurate components to be manufactured.</p> <ul style="list-style-type: none"> <li>• Determining structural suitability.</li> <li>• Health &amp; safety compliance.</li> <li>• Gauging functional efficiency.</li> <li>• Material properties.</li> <li>• Any other acceptable answer.</li> </ul> <p><b>Prototypes</b></p> <p>Used to show the final design to simulate the final design, aesthetics, materials and functionality of the intended design.</p> <ul style="list-style-type: none"> <li>• Check for any flaws.</li> <li>• Test efficiency.</li> <li>• Performance issues.</li> <li>• Check public opinion.</li> <li>• Any other acceptable answer.</li> </ul> <p><b>For each model type 2 @ 1mark each</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Comments Accept</p> </div>	<b>6</b>
	<b>Total</b>	<b>6</b>

Question 4	Answer Scheme	Marks
(a)	<p>Explanation should include at least two issues from:</p> <ul style="list-style-type: none"> <li>• Exclusivity of product/company.</li> <li>• Legal rights.</li> <li>• Company branding.</li> <li>• Prevent illegal use of logo/name.</li> <li>• Or other appropriate reason.</li> </ul> <p><b>1 mark each explanation 2@1</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	<b>2</b>
(b)	<p>Explanation should include at least two issues from:</p> <ul style="list-style-type: none"> <li>• Register ownership.</li> <li>• Protect company rights.</li> <li>• Prevent idea/patent being copied.</li> <li>• Can lease design.</li> <li>• Or other appropriate reason.</li> </ul> <p><b>1 mark each explanation 2@1</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	<b>2</b>
	<b>Total</b>	<b>4</b>

Question 5	Answer Scheme	Marks
(a)	<p>Anthropometric issues:</p> <ul style="list-style-type: none"> <li>• Chair seat width.</li> <li>• Popliteal height increased to clear stairs.</li> <li>• Longer back length.</li> <li>• Adjustability of head restraint.</li> <li>• Belt size.</li> <li>• Hand grip.</li> <li>• Or other suitable answer.</li> </ul> <p><b>1 mark each issue 3@1</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	<b>3</b>
(b)	<p>Physiological issues:</p> <ul style="list-style-type: none"> <li>• Weight of chair.</li> <li>• Strength of assistant to weight of user ratio.</li> <li>• Comfort of user.</li> <li>• Strain on back of assistant.</li> <li>• Lever lengths.</li> <li>• Ease of folding/unfolding.</li> <li>• Or other suitable answer.</li> </ul> <p><b>1 mark each issue 3@1</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept  Weight of passenger. </div>	<b>3</b>
(c)	<p>Psychological issues:</p> <ul style="list-style-type: none"> <li>• Confidence issues surrounding user.</li> <li>• Stability of chair.</li> <li>• Belt for safety.</li> <li>• High resolution colours used.</li> <li>• Construction looks robust.</li> <li>• Simplicity of use.</li> <li>• Or other suitable answer.</li> </ul> <p><b>1 mark each issue 3@1</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	<b>3</b>
<b>Total</b>		<b>9</b>

Question 6	Answer Scheme	Marks
(a)	<p>Justification should include at least two issues from:</p> <ul style="list-style-type: none"> <li>• Component size.</li> <li>• One piece construction.</li> <li>• Suitable for small production rates/Economies of scale/Batch.</li> <li>• Fairly complex shapes can be production.</li> <li>• Highly skilled workers needed.</li> <li>• Low equipment costs.</li> <li>• Shape of product. (no undercuts)</li> <li>• Any other suitable answer.</li> </ul> <p><b>1 mark each justification 2@1</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;">Comments Accept</div>	<b>2</b>
(b)	<p>Explanation should include at least two issues from:</p> <ul style="list-style-type: none"> <li>• Sand casting produces surface defects.</li> <li>• Sand indentation.</li> <li>• Removal of excess material. (Runner/Riser/Flash etc)</li> <li>• Limited quality control.</li> <li>• Does not allow close tolerances eg wheel nut spacing.</li> <li>• Does not give a smooth surface finish.</li> <li>• Any other suitable answer.</li> </ul> <p><b>Two issues 2@ 1 (extended answer worth 2 marks)</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;">Comments Accept</div>	<b>2</b>
(c)	<p>Comparison should include:</p> <p>Pressure die casting</p> <ul style="list-style-type: none"> <li>• Highly complex shapes can be produced.</li> <li>• High quality repeatability.</li> <li>• Accuracy.</li> <li>• Consistent quality.</li> <li>• No further finishing required.</li> <li>• Thin walls can be produced reducing weight.</li> <li>• Flexibility of production.</li> <li>• Speed of process.</li> <li>• Reduced storage required for patterns.</li> </ul> <p><b>NB No direct repeat from answers in parts (a) and (b)</b></p> <p><b>Three issues 3@ 1 (extended answer worth 2 marks)</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;">Comments Accept</div>	<b>3</b>

Question 6 Cont	Answer Scheme	Marks
(d)	<p>Explanation should include:</p> <ul style="list-style-type: none"> <li>• Improved mechanical strength.</li> <li>• Improved heat resistance.</li> <li>• Improved chemical resistance.</li> <li>• Improved aesthetic appearance.</li> <li>• Improved performance issues.</li> <li>• Any other appropriate answer.</li> </ul> <p><b>Two issues 2@ 1 mark</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	2
	<b>Total</b>	<b>9</b>

Question 7	Answer Scheme	Marks
(a)	<p>Factors considered:</p> <ul style="list-style-type: none"> <li>• Materials (eg performance/durability).</li> <li>• Functionality (eg sports).</li> <li>• Market niche.</li> <li>• Safety (eg UV protection).</li> <li>• Fashion.</li> <li>• Cost.</li> <li>• Or other appropriate answer.</li> </ul> <p><b>Justification of 2 factors 2@1mark</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	<b>4</b>
(b)	<p>Explanation should give indication in differences between fashion and style</p> <p><b>Fashion</b>, a general term for a currently popular style or practice.</p> <ul style="list-style-type: none"> <li>• Current trend.</li> <li>• Determined by season.</li> <li>• Temporary.</li> </ul> <p><b>Style</b>, a distinctive and identifiable appearance.</p> <ul style="list-style-type: none"> <li>• Long lasting appeal.</li> <li>• Quality product (Branding).</li> <li>• Or any other appropriate answer.</li> </ul> <p><b>1 mark for each appropriate point made 3 @1</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments Accept </div>	<b>3</b>
	<b>Total</b>	<b>7</b>
	<b>Total for section B</b>	<b>40</b>

[END OF MARKING INSTRUCTIONS]