



2011 Product Design

Higher

Finalised Marking Instructions

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**2011 Product Design Higher
MARKING SCHEME**

Question 1	Section A Answer Scheme	Marks									
(a)	<p>The chair must:</p> <ul style="list-style-type: none"> • be easily folded or unfolded • be stable (chair B) • supply adequate support when in use • be manufactured from durable materials that are suitable and appropriate for its function • be priced to suit the intended target market • ensure aesthetics suit the market niche or consumer aspirations • integrated cup holder (chair B) • production costs significantly less than selling price • be produced in a variety of colours to give target market a wider choice • be easy to clean/maintain • comply with relevant safety regulations • any other suitable statement. <p>Six statements @ 1 mark each</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="3" style="padding: 5px;">Comments: Accept</td> </tr> <tr> <td style="padding: 5px;">Lifespan</td> <td style="padding: 5px;">Corrosion issues</td> <td style="padding: 5px;">Portability</td> </tr> <tr> <td style="padding: 5px;">Comfort (chair B)</td> <td style="padding: 5px;">Weather conditions</td> <td style="padding: 5px;">Sustainability</td> </tr> </table>	Comments: Accept			Lifespan	Corrosion issues	Portability	Comfort (chair B)	Weather conditions	Sustainability	6
Comments: Accept											
Lifespan	Corrosion issues	Portability									
Comfort (chair B)	Weather conditions	Sustainability									
(b)	<p>Statements which identify issues such as:</p> <ul style="list-style-type: none"> • durability of material (<i>non corrosion</i>) • strength to weight issues • readily available materials • nylon – stretches to mould to body – dries quickly after rain • safety • suitability for production methods • function of component parts • aesthetic properties • ease of clean / hygiene • re-cycling • any other suitable statement. <p>Sample answers</p> <p><i>Aluminium offers an excellent strength to weight ratio which is ideal for use with Chair B as it has to be transported by the user. (1 mark)</i></p> <p><i>The nylon mesh offers an extremely light and hard wearing material and can be easily cleaned. (2 marks)</i></p> <p><i>Natural birch is a good choice of material for Chair A as it is durable, easily maintained and offers a good strength to weight ratio and when combined with the nylon material makes the product light yet robust. (3 marks)</i></p> <p>NB – mention of mass production can be awarded in 1(b) only Six valid statements @ 1 mark each (5+1)</p>	6									

Question 1	Answer Scheme	Marks
(c)	<ul style="list-style-type: none"> • Identification of the types or manufacturing processes used in the production of the illustrated products and how production processes relate to the materials used. Chair A – Spindle moulding, machine router, CNC. Chair B – Injection moulding, Bending/forming, Extrusion. • How manufacturing/assembly techniques are influenced by volume of production. <p>Statements could include: Standardisation of sizes, component parts all the same size. No further finishing required. Shapes suitable for process. Standardisation of components and materials chosen because they are easily sourced/formed. Suitable for mass/batch production – injection moulding. Economy of scale – mass/continuous production/JIT.</p> <p>1 mark for correct identification of process to a maximum of 3 processes. Maximum of 2 (2 @ 1) justifications per process.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Comments: Accept</p> </div>	6
(d)	<p>Any four identified issues described:</p> <ul style="list-style-type: none"> • Fitness for its purpose • Durability to withstand continual use • Safety aspects of function • Maintenance issues (manufacture only – re tooling) • Quality of raw materials • Product testing • Well trained staff • Guarantees • Warranty • Any other acceptable issue. <p>Four issues identified, 4 issues @ 1 mark each (3+1)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Comments: Accept Manufacture – Quality of standard components Consumer – High quality finish</p> </div>	4

Question 1	Answer Scheme	Marks
(e)	<p>Any identified niche market from:</p> <ul style="list-style-type: none"> • Camping • Holiday makers • Hill walkers • Climbers • Students • Any other acceptable answer. <p>Example Statement</p> <p><i>Chair A</i> <i>Chair A would be the ideal product for a hill walker as it is easily stored.</i> <i>(1 mark)</i></p> <p><i>Chair B</i> <i>This chair would appeal to the holiday maker as it can be easily transported in its folded form and is light yet durable and offers excellent support.</i> (2 marks)</p> <p>1 mark for identification + 1 for each justification (2 + 2)</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Comments: Accept Anglers Bird watchers Festival goers</p> </div>	4
(f)	<p>Any four issues described in the context of ergonomics:</p> <p>Examples from:</p> <ul style="list-style-type: none"> • Anthropometrics relating to seated position and back support • Hand sizes (for access to components) • Finger traps • Surface texture to prevent slipping • Weight for lifting/strength issues • Psychological issues – colour, ease of assembly • Comfort • Access for cleaning/maintenance • Any other relevant answer. <p>Four statements @ 1 mark each 1 mark can be awarded if range of anthropometric issues identified but not described. 1 mark can be awarded if range of physiological issues identified but not described.</p> <p>NB – a maximum of 3 marks from any ergonomic aspect.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Comments: Accept Psychology – audible click when seat legs telescope out into unfolded position (chair B)</p> </div>	4
Total for Section A		30

	Section B	
Question 2	Answer Scheme	Marks
(a)	<p>Explanation including issues</p> <p>Piercing and blanking is suitable because:</p> <ul style="list-style-type: none"> • Economies of scale • Repeatability • Accuracy • Shape of product • No finish required • Type of material used • Any other suitable answer. <p>Two statements @ 1 mark each</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments: Accept </div>	2
(b)	<p>Pressing/Press Forming</p> <p>1 mark for correct answer</p>	1
(c)	<p>Suitable material:</p> <ul style="list-style-type: none"> • Stainless steel <p>Justifications:</p> <ul style="list-style-type: none"> • Corrosion resistance • Thin material • Finish • Aesthetics • Hygiene <p>1 mark for identification of material 1 mark each for each justification 2 @ 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments: Accept Scratch resistance Chemical resistance </div>	3
Total		6

Question 3	Answer Scheme	Marks
(a)	<p>Any issues such as:</p> <ul style="list-style-type: none"> • More opportunity for creativity • More scope for innovation • More opportunity to diversify into new related product ideas • Opportunity for technological transfer. <p>1 mark each description 2 @ 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Comments: Accept</p> </div>	2
(b)	<p>Description including issues:</p> <ul style="list-style-type: none"> • Identification of client requirements • Financial constraints • Key design issues • Market requirements • Target group • Production volume • Safety issues • Market share/competition • Brand image/aesthetics <p>1 mark each description 2 @ 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Comments: Accept</p> </div>	2
(c)	<p>Any description that includes at least two issues from:</p> <ul style="list-style-type: none"> • Ideas are the Intellectual Property (IP) of the company • In-house designer has no IP rights • IP can have enormous commercial value, and can be traded as a commodity • Commercially valuable ideas can be at risk if not carefully protected • Others may gain commercial advantage should designer leave company <p>1 mark each description 3 @ 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Comments: Accept</p> </div>	3

Question 3	Answer Scheme	Marks
(d)	<p>There are five forms of protection</p> <ul style="list-style-type: none"> • Trademark • Patent • Registered Design • Copyright • Design Right <p>1 mark each description 2 @ 1</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Comments Accept </div>	2
(e)	<p>Laser sintering, Fused deposition modelling</p> <p>1 mark for correct answer</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Comments: Accept </div>	1
	Total	10

Question 4	Answer Scheme	Marks
(a)	<p>Any description that includes suitability such as:</p> <p>Rotational moulding</p> <ul style="list-style-type: none"> • Thermoplastic process • Hollow construction • One piece construction • Can dictate wall thickness • Complex shapes can be formed • No restriction on colour combinations/ addition of decals etc <p>GRP</p> <ul style="list-style-type: none"> • Suitable for small batches • Moulded in two halves and joined • Strength issues • Can be coloured separately (split colours) • Customise finish • Accept spray method of GRP <p>Example</p> <p><i>The process of rotational moulding allows for one piece construction that makes the main body watertight. (2 marks)</i></p> <p>1 mark each description for both processes 3 + 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Comments: Accept</p> </div>	4
(b)	<p>Any disadvantage relating to Rotational moulding</p> <ul style="list-style-type: none"> • High set-up costs • Relatively long cycle times • Choice of moulding material limited • Powdered plastic rather than pellets required • Some geometrical features difficult to mould • Loading and unloading is labour intensive • Any other suitable answer <p>1 mark each description 2 @ 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Comments Accept</p> </div>	2
Total		6

Question 5	Answer Scheme	Marks
(a)	<p>Description should comment on the following:</p> <ul style="list-style-type: none"> • Reflects the landscape around it • Shows natural wave shape • Provides an open pathway to users • Imitates Clydeside skyline • Smooth lines combining with the strong geometric shapes • Or any other appropriate points <p>Four statements @ 1 mark each 2 marks awarded for extended answer</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments: Accept </div>	4
Total		4

Question 6	Answer Scheme	Marks
(a)	<p>Any answer from:</p> <ul style="list-style-type: none"> • Structured project planning of production (JIT) • Increased quality assurance and control of production • Increased productivity • Reduction in stock wastage • Less hours lost in production time • Labour issues • Manufacturing costs reduced • Storage of component parts reduced • Expertise of manufacture of bought-in components employed <p>1 mark each description 3 @ 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments: Accept Reduced lead times </div>	3
(b)	<p>Description should include:</p> <ul style="list-style-type: none"> • Dependence on prompt delivery of components • Component accuracy • Quality assurance issues • The company's requirement of outsourcing bought parts • Bought parts may become obsolete • Reliability of subcontractor • Problems in meeting deadlines • Any other justified answer. <p>Two issues 2 @ 1 (extended answer worth 2 marks)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments: Accept </div>	2

Question 6	Answer Scheme	Marks
(c)	<p>Description should include:</p> <ul style="list-style-type: none"> • Identification of alternative suppliers • Identification of alternative components • The ability to change suppliers • Build in sufficient delivery timeslot • Agreed quality assurance issues • Any other justified answer. <p>Two issues 2 @ 1 (extended answer worth 2 marks)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments: Accept </div>	2
Total		7

Question 7	Answer Scheme	Marks
(a)	<p>Any justification that relates to:</p> <ul style="list-style-type: none"> • One piece construction • Complexity of shape • Strength issues • Lighter in weight • Colour combinations • Maintenance. <p>1 mark each explanation 4 @ 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments: Accept </div>	4
(b)	<p>Description should include:</p> <ul style="list-style-type: none"> • One piece design • Streamlined / low profile design • Ergonomic hand holds • Ergonomic seating position • Robust • Any other justified answer. <p>Three issues 3 @ 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Comments: Accept </div>	3
Total		7
Total for Section B		40

[END OF MARKING INSTRUCTIONS]