2011 Product Design

Higher

Finalised Marking Instructions

2011 Product Design Higher
MARKING SCHEME

	Section A	
Question 1	**Answer Scheme**	**Marks**
(a)	The chair must: • 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. **Six statements @ 1 mark each** Comments: Accept Lifespan Corrosion issues Portability Comfort (chair B) Weather conditions Sustainability	**6**
(b)	Statements which identify issues such as: • durability of material *(non corrosion)* • 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. **Sample answers** *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)* *The nylon mesh offers an extremely light and hard wearing material and can be easily cleaned. (2 marks)* *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)* **NB – mention of mass production can be awarded in 1(b) only** **Six valid statements @ 1 mark each (5+1)**	**6**

Question 1	Answer Scheme	Marks
(c)	• 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. **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. **1 mark for correct identification of process to a maximum of 3 processes.** **Maximum of 2 (2 @ 1) justifications per process.** Comments: Accept	**6**
(d)	Any four identified issues described: • 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. **Four issues identified, 4 issues @ 1 mark each (3+1)** Comments: Accept Manufacture – Quality of standard components Consumer – High quality finish	**4**

Question 1	Answer Scheme	Marks
(e)	Any identified niche market from: • Camping • Holiday makers • Hill walkers • Climbers • Students • Any other acceptable answer. **Example Statement** *Chair A* *Chair A would be the ideal product for a hill walker as it is easily stored. (1 mark)* *Chair B* *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. (2 marks)* **1 mark for identification + 1 for each justification (2 + 2)** Comments: Accept Anglers Bird watchers Festival goers	**4**
(f)	Any four issues described in the context of ergonomics: Examples from: • 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. **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.** **NB – a maximum of 3 marks from any ergonomic aspect.** Comments: Accept Psychology – audible click when seat legs telescope out into unfolded position (chair B)	**4**
	Total for Section A	**30**

	Section B	
Question 2	**Answer Scheme**	**Marks**
(a)	Explanation including issues Piercing and blanking is suitable because: • Economies of scale • Repeatability • Accuracy • Shape of product • No finish required • Type of material used • Any other suitable answer. **Two statements @ 1 mark each** Comments: Accept	**2**
(b)	Pressing/Press Forming **1 mark for correct answer**	**1**
(c)	Suitable material: • Stainless steel Justifications: • Corrosion resistance • Thin material • Finish • Aesthetics • Hygiene **1 mark for identification of material** **1 mark each for each justification 2 @ 1** Comments: Accept Scratch resistance Chemical resistance	**3**
	Total	**6**

Question 3	Answer Scheme	Marks
(a)	Any issues such as: • More opportunity for creativity • More scope for innovation • More opportunity to diversify into new related product ideas • Opportunity for technological transfer. **1 mark each description 2 @ 1** Comments: Accept	**2**
(b)	Description including issues: • Identification of client requirements • Financial constraints • Key design issues • Market requirements • Target group • Production volume • Safety issues • Market share/competition • Brand image/aesthetics **1 mark each description 2 @ 1** Comments: Accept	**2**
(c)	Any description that includes at least two issues from: • 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 **1 mark each description 3 @ 1** Comments: Accept	**3**

Question 3	Answer Scheme	Marks
(d)	There are five forms of protection • Trademark • Patent • Registered Design • Copyright • Design Right **1 mark each description 2 @ 1** Comments Accept	**2**
(e)	Laser sintering, Fused deposition modelling **1 mark for correct answer** Comments: Accept	**1**
	Total	**10**

Question 4	Answer Scheme	Marks
(a)	Any description that includes suitability such as: Rotational moulding • 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 GRP • 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 **Example** *The process of rotational moulding allows for one piece construction that makes the main body watertight. (2 marks)* **1 mark each description for both processes 3 + 1** Comments: Accept	**4**
(b)	Any disadvantage relating to Rotational moulding • 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 **1 mark each description 2 @ 1** Comments Accept	**2**
	Total	**6**

Question 5	Answer Scheme	Marks
(a)	Description should comment on the following: • 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 **Four statements @ 1 mark each** **2 marks awarded for extended answer** Comments: Accept	**4**
	Total	**4**

Question 6	Answer Scheme	Marks
(a)	Any answer from: • 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 **1 mark each description 3 @ 1** Comments: Accept Reduced lead times	**3**
(b)	Description should include: • 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. **Two issues 2 @ 1 (extended answer worth 2 marks)** Comments: Accept	**2**

Question 6	Answer Scheme	Marks
(c)	Description should include: • 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. **Two issues 2 @ 1 (extended answer worth 2 marks)** Comments: Accept	**2**
	Total	**7**

Question 7	Answer Scheme	Marks
(a)	Any justification that relates to: • One piece construction • Complexity of shape • Strength issues • Lighter in weight • Colour combinations • Maintenance. **1 mark each explanation 4 @ 1** Comments: Accept	**4**
(b)	Description should include: • One piece design • Streamlined / low profile design • Ergonomic hand holds • Ergonomic seating position • Robust • Any other justified answer. **Three issues 3 @ 1** Comments: Accept	**3**
	Total	**7**
	Total for Section B	**40**

[END OF MARKING INSTRUCTIONS]