2010 Product Design

Higher

Finalised Marking Instructions

Higher Product Design Paper 2010
MARKING SCHEME

	Section A	
Question 1	**Answer Scheme**	**Marks**
(a)	The accessory ranges must: • Be stable and sturdy • Hold the intended items • Be manufactured from durable materials that are suitable and appropriate for the Bathroom accessory's function • Be safe (complying to appropriate health & hygiene standards) • Be priced to suit the intended target market • Ensure aesthetics suit the market niche or consumer aspirations • Be easily installed by target market (set B only) • Production costs significantly less than selling price • Be produced in a variety of colours (Set A) or plated finishes and styles (Set B) to give target market a wider choice • Be easy to use • Be easy to clean • Not corrode • Replaceable brush heads • Able to be mass produced • Any other suitable statement. **six statements @ 1 mark each** Comments Accept • Lightweight/Easily moved • Recyclable • Matching colour/Part of a range • Fit a modern bathroom	**6**
(b)	Statements which identify issues such as: • Durability of material [*non corrosion/scratch resistant (Set B only)]* • Strength to weight issues • Safety • Suitability for production methods • Function of component parts • Aesthetic properties • Ease of clean / hygiene • Re-cycling • Form of material eg decorative ends (set B) are suitable for mass production using pressure die casting. • Any other suitable statement. **Sample answers** Frosted acrylic is a good choice because the bathroom set must be durable enough to take everyday usage and wear-and-tear. **(1 mark)** The use of the chrome finished metal will blend in with most bathroom styles. **(1 mark)**	

Question 1	Answer Scheme	Marks
(b) cont	Chrome plated metal is a good choice of material for set B because it does not corrode when in contact with water. It keeps its shiny appearance making it look both appealing and hygienic. **(2 marks)** **six valid statements @ 1 mark each (5+1)** Comments Accept • Resistant to shock (Set A & B) • Glass is tough/durable, can withstand weight	**6**
(c)	• Justification of the types or manufacturing processes used in the production of the illustrated products and how production processes relate to the materials used. Acceptable processes: Set A – Injection moulding/compression moulding Set B – Die casting/Bending/Press-forming/Extrusion/Electro plating • 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, pressure die casting. Economy of scale – mass/continuous production. **Any six relevant issues about materials, processes and their relationships regarding suitability. (4+2)** Comments Discussion regarding manufacture of brush heads then award marks accordingly No marks for identification of process	**6**

Question 1	Answer Scheme	Marks
(d)	Any four identified issues explained: • Fitness for its purpose • Durability to withstand continual use • Stability of free-standing units • Easy to clean/hygienic • Easy to use • Safety aspects of function • Maintenance issues • Easy to install • Any other acceptable issue. **Four issues identified, 4 issues @ 1 mark each (3+1)** Comments Accept	**4**
(e)	Any four identified issues described: • Cost (only if justified as a comparison) • Aesthetics • Durability • Brand name/image • Recyclable • Hygienic • Look of a quality product • Compliment existing products • Any other acceptable issue. **Example Statement** *Set A* 'Set A' is made from a thermo plastic which makes it easy to clean and therefore hygienic **(1 mark)** *Set B* This bathroom set has a very traditional look because it is made from plated metal and has used similar features throughout the range. The set looks expensive and well made and should last a long time. **(2 marks)** **4 issues @ 1 mark each (3+1)** Comments Accept • Lightweight/Easily moved	**4**

Question 1	Answer Scheme	Marks
(f)	Any four issues described in the context of ergonomics relating to bathroom accessory sets. Examples from: • Grip • Hand sizes (for access to components) • Finger traps • Surface texture to prevent slipping • Weight for lifting/strength issues • Colour - psychological • Comfort • Access for cleaning/maintenance • Any other relevant answer. **4 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.** Comments Accept Psychology • Feeling of cleanliness • Simple design/Ease of use • Looks safe and simple to use (Set A)	**4**
	Total for Section A	**30**

	Section B	
Question 2	**Answer Scheme**	**Marks**
2	**Annotated Sketches** • Initial ideas/concepts • Design development Used to quickly communicate ideas/concepts without giving too much detail. **Working Drawings** • Planning for manufacture • Production of prototypes Used when dimensions/machining details are required allow accurate components to be manufactured. **Rendered 3D Computer Models** • Presenting a design proposal to the client • Computer Testing/Evaluating • Marketing **Sample answer** A 3D computer model can be used to visually communicate a design proposal to a client. This will allow the client to make an initial assessment prior to production of a prototype. **(2 marks)** Any suitable answer for each stage **1 mark for identifying stage & 1 mark for each explanation.** **(a maximum of 3 marks can be awarded for each stage, all stages must be explained to attract full marks)** Comments Accept	
	Total	**6**

Question 3	Answer Scheme	Marks
3 (a)	Statements could include: • Increased use of landfill disposal due to limited lifespan • Increased use of non renewable resources • De-forestation • Increased use of recycled/waste materials (re-use of standard components) • Pollution produced during manufacture • Any other relevant answer. **Two issues 2@ 1 (extended answer worth 2 marks)** Comments Accept	**2**
(b)	Statements could include: (i) **The consumer:** • Assembly guidelines are clear *(easy to assemble)* • Product is available in a variety of finishes • Suited to modern designs • Easy to transport • Available in a wide variety of configurations • Low cost • Any other acceptable issue (must be specific <u>not</u> general). (ii) **The manufacturer:** • Product diversification • Use of CAD/CAM • Standardisation of components • Materials chosen because they are easily formed • Jointing methods suitable for mass/batch production – spindle moulder, CNC, etc. • Stock sizes suitable for flat pack production • Low-skill requirements in production • Manufacturing management systems such as JIT production • Project planning of assembly • Storage • Any other justified answer. **Answers MUST be explained 2+2** Comments Accept • Less packaging required	**4**

Question 3	Answer Scheme	Marks
(c)	Statements could include: • Consumer testing • Use of standard components/simple knock down fittings • Clear instruction leaflets • Supplied tools • Assembly components organised in a packet • Any other justified answer. **To achieve full marks an extended answer is required** Comments Accept	**2**
(d)	Statements could include: • High quality of materials • High quality of finish achieved • Greater durability than flat-pack • Quality of look/attractive • Build quality (dovetails etc) • No assembly required • Brand image • any other justified answer. **To achieve full marks an extended answer is required** Comments Accept	**2**
	Total	**10**

Question 4	Answer Scheme	Marks
4 (a)	Statements could include: • Compression moulding is mostly used to make larger flat or moderately curved parts (suitable form for process) • Is a high-volume, high-pressure method suitable for molding complex shapes • One piece production • Is one of the lowest cost molding methods • Wastes relatively little material • Accuracy with little shrinkage • Thermosetting plastic process • Any other relevant answer. **1 mark for each reason 2@1** Comments Accept	**2**
(b)	**Material selection:** Melamine Formaldehyde Bakelite Urea Formaldehyde GRP Phenol Formaldehyde **Justification:** Statements could include: • Thermosetting plastic, electrical insulator, scratch resistance, strength/durability issues, temperature insulator. **1 mark for identification of material** **2 marks for justification** Comments Accept	**3**
	Total	**5**

Question 5	Answer Scheme	Marks
5 (a) (i)	**Initial concept** Statements could include: • Client needs • Target market requirements • Other products on the market • Legislation restrictions • IPR issues • Knowledge of up-to-date materials and technology • Appropriate materials for manufacture • Any other justified answer. **1 mark each valid point made in description. 2 @ 1** Comments Accept • Consumer demand	**2**
(ii)	**Planning for Production** Statements could include: • Appropriate manufacturing techniques • New manufacturing techniques available • Production timings and costs • Sub contractors/sources of standard components • Delivery times (materials/standard components) • Sources/quality of materials • Any other justified answer. **1 mark each valid point made in description. 2 @ 1** Comments Accept • Production costs/Material costs	**2**

Question 5	Answer Scheme	Marks
(b)	**End user trials** Statements could include: • Safety issues • Ergonomic issues relating to redesign • Economic considerations (Pricing structure) • Functional/Performance issues • Environmental concerns/sustainability??? • Durability • Variety of models/colours required • Any other justified answer. **1 mark each valid point made in description. 2 @ 1** Comments Accept	**2**
	Total	**6**

Question 6	Answer Scheme	Marks
6 (a)	Statements could include: • Material in thin sections • Material suited to process (malleable/ductile) • Accuracy of sizes • Repeatability/Consistency in quality • Edges require no further finishing • Increased strength of component after bending • Any other relevant answer. **1 mark each valid point made in description. 3 @ 1** Comments Mention of mass production – 0 marks	**3**
(b)	Statements could include: • Ease of assembly • Ease of replacement/repair • Non permanent fixings allow for movement in the frame • Quality issues • Cheaper to purchase • Saves time/Manufacturing costs • Any other relevant answer. **1 mark each valid point made in description. 2 @ 1** Comments Accept • Cheaper to purchase • Saves time/ Manufacturing costs *NB – if marks awarded in this section, then no marks in part (c) –repeat answer* • Assembled using standard tooling	**2**
(c)	Statements could include: • JIT • Product diversification • Lower costs • Reduced storage/manufacturing space required • Quality assurance procedures reduced • Any other relevant answer. **1 mark each valid point made in description. 2 @ 1** Comments Accept • Reduced need/cost on employee training	**2**
	Total	**7**

Question 7	Answer Scheme	Marks
7 (a)	Statements could include: • Increased functionality • Durability of materials • Costs reduced due to improved manufacturing methods • Improved reliability of operation • Miniaturisation (portability) • Fashion issues • Planned obsolescence • Technology transfer opportunities • Environmental considerations • More powerful/faster operation • Any other relevant answer. **1 mark for basic explanation** **2 issues explained 2 @ 1** Comments Accept • Colour/touch screen – clearer image • Multi-functional device as opposed to several	**2**
(b)	*Statements could include:* (i) **The designer** • Ideas are the Intellectual Property (IP) of the creator, either of an individual or a company • Ensure that they are not infringing other patents etc. • Original design drawings must be kept safe as proof. • An in-house designer has no rights to the design, all rights lie with his/her employer • A freelance or consultant designer may be able to protect his design by use of a patent. (ii) **The client/manufacturer** • Will protect them by the use of patents and/or trademarks. but as patents are in the public domain these ideas may be copied by other companies in other parts of the world. • Creative processes which generate new ideas may have commercial value • Commercially valuable ideas can be at risk if not carefully protected, and others may gain commercial advantage as a result • IP can have enormous commercial value and can be traded as a commodity. **1 mark for basic explanation and 2 marks if the answer is extended to show deeper understanding of IPR issues** Comments Accept	**2** **2**
	Total	**6**
	Total for Section B	**40**

[END OF MARKING INSTRUCTIONS]