2009 Product Design

Higher

Finalised Marking Instructions

Higher Product Design Paper 2009
MARKING SCHEME

	Section A	
Question 1	**Answer Scheme**	**Marks**
(a)	The sets must: • be stable • be light enough for intended user to lift and be able to use easily • be durable (related to mechanism/life cycle) • be manufactured from materials that are suitable and appropriate for the condiment set's function • be safe (complying to appropriate hygiene standards) • be comfortable to use for hand grip sizes for the 5%ile female to use (both sets) • be comfortable for the 5%ile female to grip and press the push button control (Set B only) • be costed to suit the market niche/consumer • ensure aesthetics suit the market niche or consumer aspirations • production costs significantly less than selling price • provide a variety of grinding settings from fine to coarse • be easy to change batteries (Set B only) • be easy to refill • to grind salt/pepper • any other suitable statement eg maintenance issues **Six statements @ 1 mark each** **NB no marks awarded for technical related specifications**	**6**

Question 1	Answer Scheme	Marks
(b)	Statements which identify issues such as: • durability of material eg corrosion resistance, mechanism, general materials issues • strength issues • safety • suitability for production methods • function of component parts • aesthetic properties • ease of clean/hygiene • re-cycling • form of material eg wooden casing and top is suitable for batch producing using mechanised or CNC machining • any other suitable statement. **Sample answers** 'The durability of the condiment set must be strong enough to take everyday usage and wear-and-tear **(1 mark)**. In one metal set the plastic see-through holder allows you to see if it is pepper or salt' **(1 mark)**. 'The style of the condiment sets would need to be aimed at what the intended market likes **(1 mark)**. For example, the wooden set would appeal to a more traditional end user and could also be used in more traditional restaurants such as Italian ones. They could also come in a variety of hardwoods to suit different settings **(3 marks)**. The metal set is more specifically aimed at consumers who like modern kitchen gadgetry and is modern, and could be a 'talking point' for their friends when they come round' **(worth 2 marks)**. **Six valid statements @ 1 mark each (5 + 1)**	**6**

Question 1	Answer Scheme	Marks
(c)	• Identification of the types of manufacturing processes used in the production of the illustrated products and how production processes relate to the materials used. • How manufacturing/assembly techniques are influenced by volume of production. **Statements could include:** Standardisation of sizes, component parts all the same size. Jointing methods suitable for mass/batch production ie injection moulding, CNC − shapes and form, spinning, piercing & blanking, extrusion, press forming. Standardisation of components and materials chosen because they are easily sourced/formed. Economy of scale – mass/continuous production. **Any six relevant issues about materials, processes and their relationships regarding suitability.** **Maximum 3 marks** for one condiment set.	**6**
(d)	Any four identified issues under the headings of: • fitness for purpose • force required operating either set. Set A requires some strength to cope with the twist action but Set B has battery operated push button activation • durability to withstand continual use • stability to ensure that the free-standing units do not topple over too easily • hygienic issues • ease of adjustment • maintenance ie battery changing • refilling • any other acceptable issue. **Four issues identified, 4 issues @ 1 mark each**	**4**
(e)	Any four identified issues under the headings of: • traditional and homely versus modern and sleek • chunky style as opposed to clean lines • ergonomic styling so the product LOOKS comfortable to use • warm versus cold materials • aesthetics • image • brand name • compliment existing tableware/kitchen utensils • any other acceptable issue. **Example Statement** Set A 'The wooden condiment set has a very traditional look because it is made from wood and has a very well known shape. The design of the set has curves that subtly reflect natural forms' **(worth 3 marks).** Set B 'Set B's main body shell is made from stainless steel which makes it hygienic' **(worth 1 mark).** **Four issues @ 1 mark each (3 + 1)**	**4**

Question 1	Answer Scheme	Marks
(f)	Any four issues described in the context of ergonomics relating to condiment sets. Examples from: • grip • hand sizes • thumb and hand grip reach (Set B) • two hand control (Set A) • finger traps • surface texture prevents slipping • physiological issues such as strength • weight for lifting • organic shape – psychological • comfort • maintenance • any other relevant answer. **Four statements @ 1 mark each** **1 mark can be awarded if range of anthropometric issues identified but not explained.** **1 mark can be awarded if range of physiological issues identified but not explained.**	**4**
	Total for Section A	**30**

	Section B	
Question 2	**Answer Scheme**	**Marks**
(a) (i)	Compression moulding or Thermoset injection moulding	**1**
(ii)	*Reasons* • Repeatability. • Accuracy. • Complex shape geometry. • Thermosetting plastic process. • Any other relevant answer. **1 mark each valid reason given**	**2**
(b) (i)	**Answers given must be descriptive. No marks are awarded for simple statements and lists.** • Durability. • Strength to weight ratio. • Hygiene. • Aesthetics. • Heat transfer. • Any other suitable answer. **Two descriptions @ 1 mark each**	**2**
(ii)	**Answers given must be descriptive. No marks are awarded for simple statements and lists.** • Flexibility to source different types of hardwood according to availability and raw material cost. • Could lead to choice restriction for the consumer. • Allows variation for colour changes in wood. • Increased consumer choice. • Not from sustainable source/recycling. • Any other suitable answer. **Three descriptions @ 1 mark each (2 + 1)**	**3**
	Total	**8**

Question 3	Answer Scheme	Marks
(a)	• Test rigs – ability to test and measure performance issues such as durability, reliability and wear-and-tear over a variety of surfaces/ time lengths. • User Trials – test and measure issues such as ease of use/ maintenance; ergonomic factors; accessibility (corners of rooms/ underneath furniture to get at dust traps); flexibility. • Any other suitable statement. **1 mark for naming the correct strategy and 1 mark for each valid reason given 4 @ 1**	**4**
(b)	• Surveys through questionnaires – ability to evaluate current performance issues such as customer satisfaction, market needs and wants, and problems consumers have with the product and potential development opportunities to improve product. • Product placements – ability for market researchers to observe customer reaction to the product when set against competitors' products (wow factor). Opportunity to observe the product's performance when used by a consumer in a typical home setting. • Any other suitable statement. **1 mark for naming the correct strategy and 1 mark for each valid reason given (2 + 2)**	**4**
	Total	**8**

Question 4	Answer Scheme	Marks
(a)	• Use of modern design processes such as RP and solid modelling which reduce lead time to get the product to the market. • Reduced lead times. • Reduced costs incurred in R & D mean products which were marginal become profitable. • More information gathered. • Increased profits at later stages in life cycle. • Continual development in technology. • Prototype can be easily modified. • Ability to edit and make changes to the design relatively quickly. • Reduce manufacturing costs so product is cheaper to the market. • Reduced outsourcing to specialist model makers. • Any other suitable answer. **1 mark for each valid answer 2 @ 1**	**2**
(b)	**No marks awarded for naming each stage or an interpretation of the graph.** **Example Statement** **Stage 2 –** The R & D costs are getting smaller and sales are increasing **(1 mark)**. **Example statement** At stage 4, the sales in the product peak and begin to decline resulting in the profit margins falling as a result of continual manufacturing costs **(1 mark)**. **To achieve maximum marks for this section, the candidate must explain each of the stages 2 to 5.** **1 mark for a simplified explanation of each stage 4 @ 1** **3 marks can be awarded for an extended explanation of any stage**	**6**
	Total	**8**

Question 5	Answer Scheme	Marks
(a)	• Greater use of recycled materials. • Reduction in use of non-renewable materials. • Reduced waste from manufacture of components. • Thinner body parts to reduce overall weight and cut down on both material costs and fuel consumption. • Alternative materials. • Less carbon emissions. • Development of engines to burn on bio-fuels. • Any other suitable answer – linking materials to environment. **1 mark each valid point made in description 4 @ 1**	**4**
(b)	• Advertising to highlight the aspects of their product which makes it 'greener'. • Recycling marks on components to indicate easier identification of material type. • Car decals to focus on eco-friendly product – eg Vauxhall's 'Ecotec' name on an engine range. • Leaflets and point-of-sale information stands in car sale rooms. • High profile research into alternative fuels. • Staff better trained to provide information about 'green' credentials when customers make enquiries. • Any other suitable answer. **1 mark each valid point made in description 4 @ 1**	**2**
	Total	**6**

Question 6	Answer Scheme	Marks
(a)	Eames La Chaise Chair • Moulding enabled designers to explore new complex forms and shapes. • The process enabled designers to develop chairs which were very modern and futuristic looking. • They now had the ability to create shapes which enhanced the physical performance of the chair. • Strength issues ie webs could be incorporated into the chair design. • Any other suitable answer. Lounge Chair • Laminated wood and steam bending allowed the designer to explore traditional working properties of wood in a more dynamic way. • These processes allowed the designer to develop a 'new' shape and form which had never been seen before. • They could use the mechanical properties of wood but in an improved and more economically efficient manner. • Industrial steam bending techniques allowed for repeatability and more consistent manufacturing qualities. • Any other suitable answer. **1 mark each valid point made in description 6 @ 1** **NB No marks awarded for repetitive answers**	**6**
(b)	• Greater flexibility to 'push the technological boundaries'. • More opportunities to be creative in using these new materials to develop products. • Ability to enhance the working performance and characteristics of products such as sports equipment like tennis racquets, golf clubs, etc. • Better strength to weight ratios. • Utilises the best properties of materials. • Any other suitable answer. **1 mark each valid point made in description 4 @ 1**	**4**
	Total	**10**
	Total for Section B	**40**

[END OF MARKING INSTRUCTIONS]