X211/701

NATIONAL QUALIFICATIONS 2011

TUESDAY, 17 MAY
1.00 PM – 4.00 PM

PRODUCT DESIGN ADVANCED HIGHER

100 marks are allocated to this paper.

Where appropriate you may use sketches to illustrate your answer.

For question 7, answer either 7(*a*) or 7(*b*).

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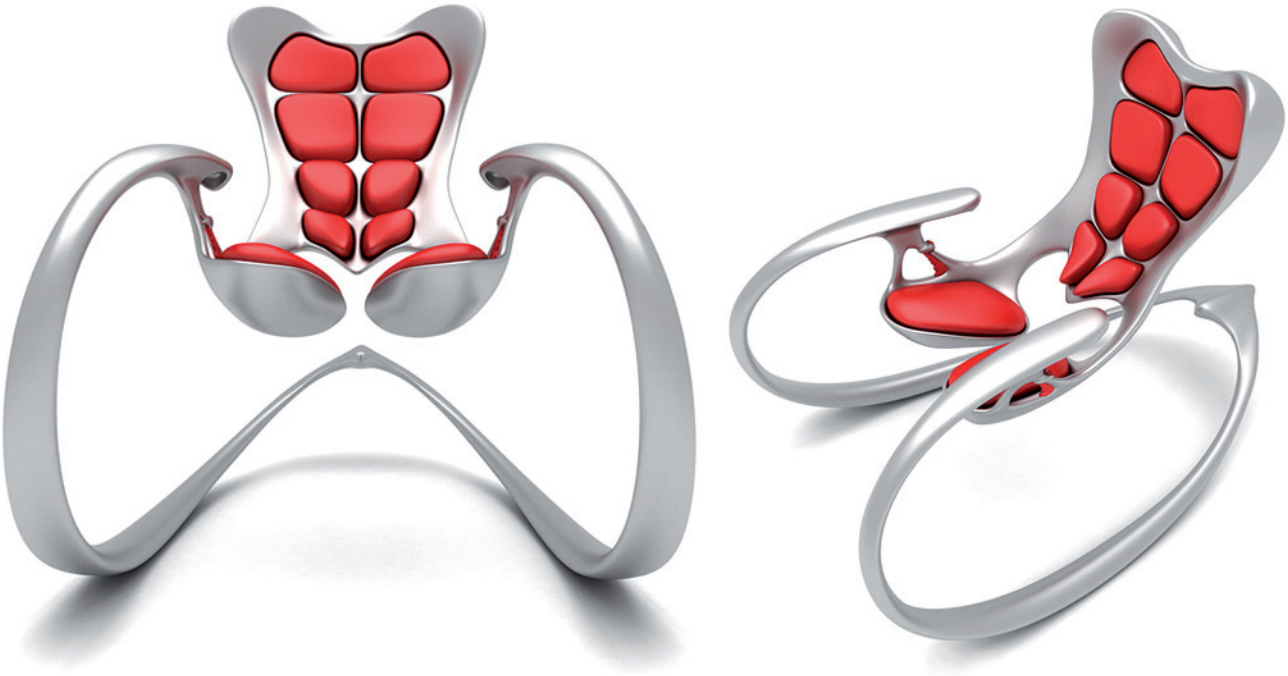
Attempt ALL questions. *Marks*

1. The Ruby Rocking Chair was designed for an international design competition. Although described as a masterpiece of modern design, it is unlikely to enter into commercial production.



(*a*) Describe **three** reasons why the Ruby Rocking Chair is unlikely to go into commercial production. **3**

It would be possible to produce the chair by rotational moulding or injection moulding.

(*b*) Discuss the advantages and disadvantages offered by rotational moulding and injection moulding in the production of the Ruby Rocking Chair. **4**

(*c*) (i) Explain why the use of a composite material, such as carbon fibre, would be suitable for the chair's frame. **2**

(ii) Describe the problems which may be associated with **manufacturing** the chair. **2**

The Ruby Rocking Chair was developed and presented to the client using Computer Aided Design.

(*d*) (i) Explain the possible disadvantages of using computers in the early development of products. **2**

(ii) Describe the advantages computers offer during the testing and evaluation stage of the design process. **2**

(15)

Marks

2. The Butter Stool designed by Sarah Gibson and Nicholas Karlovasitis is made with plastic recycled from milk containers.

The stool is produced in one piece and is easily assembled by simply folding.

(*a*) Describe the potential difficulties associated with the manufacture and production of the Butter Stool. **4**

The Butter Stool is aimed at a market where eco-friendly credentials are important. Such a focus on eco-friendly design can cause conflict with other issues.

(*b*) Describe conflicts that may be created when designers attempt to balance eco-friendly design with other issues. **4**

The Butter Stool was manufactured using batch production.

(*c*) (i) Outline the reasons batch production was suitable for this product. **2**

(ii) Describe another manufacturing system which could be used in manufacturing products. You should use examples of products to illustrate your answer. **4**

(14)

[Turn over

Marks

3. The innovative kettle shown uses a unique heat resistant plastic and induction technology in its design.

The use of induction technology makes traditional metal contacts redundant; simply placing the kettle on the flat white base allows water to be boiled.

(*a*) Describe how advances in **materials** and **technologies** have influenced the development of other products. **6**

Launching innovative products into the market place can be a risk for a business.

(*b*) (i) Describe the potential risks associated with launching innovative products to the market. **3**

(ii) Describe the steps a company can take to reduce these risks. **3**

(12)

Marks

4. The Aquatio Water Fountain shown has been designed for use in Fitness Centres. It allows the user to dispense water from the fountain at the top or to fill a water bottle from the dispenser on the bottom.

Pressing the left side of the Aquatio Water Fountain delivers cold water, pressing the right side delivers water at room temperature.

Products are usually designed by teams which often include market researchers.

With reference to the Aquatio Water Fountain.

(*a*) Describe the roles of **three** other members of the design team and how they may have influenced the final product. **6**

When designing for a market niche, research is very important. The designers of the Aquatio Water Fountain have taken care to identify the needs of Fitness Centre users.

With reference to the Aquatio Water Fountain.

(*b*) (i) Describe a range of suitable activities the researcher may have undertaken to ensure that the needs of the target market **were identified**; **3**

(ii) Describe the steps the company may have taken to ensure the needs of their target market **were met** prior to the production of the water fountain. **3**

(*c*) Describe how the designer may have ensured the economic manufacture and distribution of the Aquatio Water Fountain. **6**

(18)

[Turn over

Marks

5. The "Flamingo" Crutch shown below was designed by Can Guvenir to improve the aesthetics and ergonomics of the traditional crutch.

(*a*) (i) Identify key pieces of anthropometric data that would be considered important when designing the Flamingo Crutch and explain how they would influence its dimensions. **3**

(ii) Explain the difficulties in selecting anthropometric data in relation to the design of a product such as the Flamingo Crutch. **3**

(iii) Anthropometrics is one aspect of ergonomics that would have been considered when designing the Flamingo Crutch. Describe how other aspects of ergonomics would impact on its comfort and ease of use. **3**

(iv) With reference to products with which you are familiar, explain how designers ensure that products are easy and comfortable to use. **3**

The evolution of crutches has predominantly focused on the primary function of supporting the user.

(*b*) Describe other issues that could be considered to develop a more usable and effective crutch. **3**

(15)

Marks

6. The two toothbrushes shown below were created for different market groups. One provides a traditional and affordable method of cleaning teeth while the other more expensive utilises the latest dental technology.

The use of induction technology has been transferred from other products to allow the electric toothbrush to be safely charged. Technology transfer is one method of generating ideas for products.

(*a*) Describe **two** other methods which could be used to generate ideas. **4**

The use of induction technology is one critical stage in the evolution of toothbrushes.

(*b*) Describe critical stages in the evolution of a product with which you are familiar and outline how these influenced the product. **6**

Designers are required to consider ethical issues when designing products.

(*c*) Describe the ethical issues surrounding the production, sales and marketing of products with which you are familiar. **4**

(14)

[Turn over for Question 7 on *Page eight*

Marks

7. Answer ***either*** Question **7(*a*) or 7(*b*)**.

(*a*) "*Environmental concerns will increase in value over profit margins with, for example, materials, buildings and objects being routinely recycled.*" Jane Atfield

Discuss how environmental concerns are influencing the design of products. You should use a range of examples to support your answer. **12**

OR

(*b*) "*The future could be bright for product design, as long as we don't feel the need to operate under the old dictates of mass production.*" Elephant Design

Mass production has allowed products to be manufactured in huge numbers at low cost. However, there are drawbacks to mass production. Discuss alternatives to mass production and their advantages and disadvantages. You should use examples to support your answer. **12**

(12)

[*END OF QUESTION PAPER*]

ACKNOWLEDGEMENTS

Question 1—Images of *The Ruby Rocking Chair* designed by Pouyan Mokhtarani. Electronic rights are reproduced by kind permission of Pouyan Mokhtarani.

Question 2—Photograph of *The Butter Stool* designed by Sarah Gibson and Nicholas Karlovasitis is reproduced by permission of DesignByThem.

Question 4—Images of the *Aquatio* (now *Aquafit*) water fountain designed by Byron Lee. Permission is being sought from Byron Lee.

Question 5—Images of the *Flamingo Crutch* designed by Can Güvenir is reproduced by kind permission of Can Güvenir.

Question 6—Image of an *Oral-B toothbrush*. Permission is being sought from Procter & Gamble.