



2011 Product Design

Advanced Higher

Finalised Marking Instructions

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Question 1

- (a) 1 mark for each valid description linked to the commercial production of the Ruby Rocking Chair.

Areas that could be described could be:

- Size of target market.
- Consumer demand.
- Distinctive styling/aesthetics.
- Manufacturing costs/tooling cost.
- Limitations of current manufacturing processes.
- Skills and time required to manufacture.

Maximum 3 marks

- (b) 1 mark for each valid point relating to the advantages or disadvantages of rotational moulding and injection moulding. Marks will only be awarded to different advantages or disadvantages that relate to the Ruby Rocking chair. Maximum of 3 marks will be awarded to each process. Candidates must consider both advantages and disadvantages to be awarded full marks.

Injection moulding	Rotational moulding
Advantages: Can produce complex forms. One process no fabrication required. Less waste through the moulding process. Can provide low unit cost if demand is high Accurate parts can be made when alignment is crucial to the product's assembly. Can use coloured plastics. Provides a good surface finish.	Advantages: Can produce large organic shapes. Can provide a thick wall of plastic offering strength. Accurate. Could produce the chair without any assembly or secondary processes. Can use coloured plastics. Provides a good surface finish.
Disadvantages: Expensive setup costs. Moulds are expensive to produce. Produces thin wall thickness. Inflexible method of production. Requires large production runs to be economical.	Disadvantages: Moulds are expensive to produce. Inflexible method of production. Requires large production runs to be economical. May require to be done in sections.

Maximum 4 marks

- (c) (i) **1 mark for each valid reason that explains the suitability of composites that clearly relates to the chair.**

Answers could include:

- Advantage gained from combining different materials.
- Enhanced properties.
- Improved strength to weight ratio.
- Chair could be fabricated in small numbers.

Maximum 2 marks

- (ii) **1 mark for each valid point that leads to a clear description of the problem**

Answers could include:

- Size and volume.
- Complex form.
- Negative space.
- Gaining required strength from materials.
- Complexity of the mould.
- Removing chair frame from mould.
- Ensuring a good flow rate.

Maximum 2 marks

- (d) (i) **1 mark for each valid statement leading to a clear explanation of possible disadvantages offered by computers in the early development stages.**

Answers could include:

- Less flexible than free-hand sketching.
- Limited to the software capabilities.
- Initially time consuming.
- More constrained.

Maximum 2 marks

- (ii) **1 mark for each valid statement leading to a clear description of possible advantages offered by computers in the testing and evaluation stages of the design process.**

Answers could include:

- Improved visualisation.
- Facilitates alteration and change.
- Virtual testing of models.
- Rapid prototyping.

Maximum 2 marks

(Total 15 marks)

Question 2

(a) 1 mark for each valid description of difficulty.

Answers could include:

- Reduction of waste.
- Ease of assembly.
- Durability of the folds.
- Elimination of post process finishing.
- Nesting of products.
- Accuracy.

Maximum 4 marks

(b) 1 mark for each valid description of conflict.

Answers could include explanation of conflict between eco friendly design and

- | | | |
|---------------------------|---|--|
| <i>Cost</i> | – | recycling costs add to the overall cost of the new product. |
| <i>Function/Materials</i> | – | material properties are often compromised during the reprocessing of used materials. |
| <i>Materials</i> | – | availability of materials could be an issue when manufacturing for a mass market. |
| <i>Aesthetics</i> | – | Often little value is put on the look of this type of product. |

Maximum 4 marks

(c) (i) 1 mark for each valid reason.

Answers could include:

- Quantity likely to be produced.
- Processes/steps involved.

Maximum 2 marks

- (ii)** Description of one other manufacturing system, eg mass production, job production, continuous production.

1 mark for each valid point up to a maximum of 4 marks

(Total 14 marks)

Question 3

- (a) **1 mark for each valid point related to materials or technologies relating to development of other products.**

Answers could include:

- Miniaturisation.
- Reduction in weight coupled with increased strength.
- Improved thermal properties.
- Solid state technology (no moving parts).
- Increased capacity to store information (data storage).

Maximum 6 marks

- (b) (i) **1 mark for description of each potential risk.**

Answers could include:

- Product unfamiliar to market.
- High capital investment.
- High advertising costs.
- Competitors launch similar products at same time.
- Breaking into market.

Maximum 3 marks

- (ii) **1 mark for description of each step.**

Answers will depend on answers to b(i) and could include:

- Advertising strategies.
- Research strategies.
- Marketing strategies.
- Cost reductions.

Maximum 3 marks

(Total 12 marks)

Question 4

- (a) **Description of role of 3 team members, 1 mark per member up to 3 marks. Description of how member may have influenced Aquatio Water Fountain, 1 mark per member up to 3 marks.**

Maximum 6 marks

- (b) (i) **1 mark per description of suitable activity. A detailed description of an activity may be awarded 2 marks. Simply naming an activity will not attract marks.**

Answers could include descriptions of:

- Survey of gym users.
- Consulting gym owners.
- Interviewing Sports scientists.
- Observation of gym users in the gym environment.
- Expert appraisal.

Maximum 3 marks

- (ii) **1 mark per description of suitable step. A detailed description of a step may be awarded 2 marks.**

Answers could include:

- Producing and testing prototypes in the gym environment.
- Using focus groups to evaluate the prototype models.

Maximum 3 marks

- (c) **1 mark per valid point.**

Answers could include:

- Transportation – consideration of volume of boxes
– manufacturing close to major transportation networks.
- Manufacture – minimal use of materials
– use of manufacturing process and materials that allow on-site recycling of waste.
- Promotion – targeting specific locations
– product endorsement (get large gyms on side and encourage smaller independent gyms to follow suit)
– linking water consumption during exercise to improved health & performance.

Maximum 6 marks

(Total 18 marks)

Question 5

- (a) (i) 1 mark for each valid piece of anthropometric data identified with clear explanation as to its influence. No mark will be awarded for identification only.

Answers may include:

- Leg length in relation to crutch length.
- Elbow length in relation to arm support.
- Hand grip in relation to handle diameter.

Maximum 3 marks

- (ii) 1 mark for each valid point leading to a clear explanation relating to the difficulties of selecting anthropometric data.

Answers may include:

- Different size ratio of body parts.
- Wide range of users.
- Wide range of anthropometric data required.
- Dynamic/static use of crutch.

Maximum 3 marks

- (iii) 1 mark for each valid point leading to a clear description of the impact of other ergonomic factors on comfort of the Flamingo crutch.

Answers may include:

- Consideration of physical movement when using crutch.
- Physical strength required to use or adjust crutch.
- Psychological impact through image and aesthetics.

Maximum 3 marks

- (iv) 1 mark for each valid point that clearly explains how a designer has made identified products or product comfortable and easy to use.

Answers may include:

- Modelling.
- Testing.
- Prototypes.
- User tips.
- Expert appraisal.

Candidates may also approach this question by describing how particular products have been made easy and comfortable to use, eg “the height of the pram handle was at an appropriate level for the users”. Marks should be awarded for appropriate comments.

Maximum 3 marks

- (b) 1 mark for each valid point that leads to a clear description of other issues that could be considered to develop a more usable and effective crutch.

Maximum 3 marks

(Total 15 marks)

Question 6

- (a) **Vague description 1 mark**
Detailed description 2 marks
Simply naming activity will not attract marks

Answers could include:

- Existing products.
- Like product types.
- Technology transfer.
- Life style boards.
- Mood boards.
- Situational analysis.

Maximum 4 marks

- (b) Candidate will be expected to describe in detail at least two critical stages in a product's evolution and clearly identify how this has influenced the development of a product.

Maximum of 2 marks for critical stages ×2

Maximum of 2 marks for valid impact ×2

Maximum 6 marks

- (c) 1 mark for each valid point that leads to a clear description as to the ethical issues surrounding the production, sales and marketing of a product.
No marks to be awarded for generic statements about products in general.

Maximum 4 marks

(Total 14 marks)

Question 7

This question is set to test the candidate's ability to present a reasoned discussion about a design issue. Although there is an underlying body of design knowledge required to answer it there is a very wide range of possible answers. Therefore the question is marked holistically. The features which are looked for are knowledge of the subject matter, ability to comprehend the question and to construct an answer which uses clear examples to support the points made.

The table below is designed to assist with the placing of answers within the full mark range.

0-3	4-6	7-9	10-12
<p>An answer which falls into this category may do so for a number of reasons. It could be that:</p> <ul style="list-style-type: none">• It demonstrates very little knowledge or understanding of the subject matter.• There is little or no reference to products.• Very few points are made.• Much of it does not answer the question.• The answer is simply too thin.	<ul style="list-style-type: none">• Knowledge of the subject matter and a secure understanding of the main aspects will be demonstrated.• The answer will be relevant to the question.• Reference to at least one product.• Although examples are used points made are unclear.	<ul style="list-style-type: none">• Knowledge of the subject matter and a secure understanding of the main aspects will be demonstrated.• The answer will be relevant to the question and demonstrate a good level of comprehension.• Reference to a few products or selected references to a number of products.• Several clear points are made and examples are used to support them.	<ul style="list-style-type: none">• Detailed knowledge of the subject matter and a secure understanding of all aspects will be demonstrated.• The answer will be relevant to the question demonstrating a high level of comprehension.• Very detailed reference to a few products or selected references to a wide range of products.• Examples are clearly used to illustrate and support points.

(Total 12 marks)

[END OF MARKING INSTRUCTIONS]