

X211/301

NATIONAL
QUALIFICATIONS
2007

TUESDAY, 22 MAY
1.00 PM – 3.00 PM

PRODUCT DESIGN
HIGHER

70 marks are allocated to this paper.



Attempt ALL questions.

SECTION A

1. The “Ant” and “Beluga” chairs shown were designed for a similar market.



Chair 1

Ant Chair

Designed by Arne Jacobsen

Price £45

Laminated plywood seat

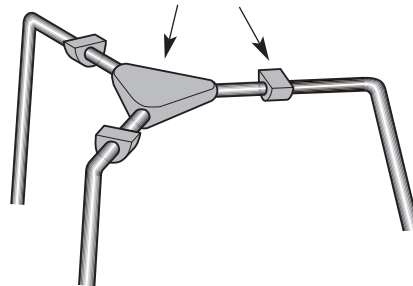
Chrome plated tubular steel legs

Polypropylene mounting brackets

Available in many colours and finishes

Stackable

Polypropylene mounting brackets



Chair 2

Beluga Chair

Price £25

Stackable chair

One piece

Injection moulded Polypropylene

Available in many colours



1. (continued)

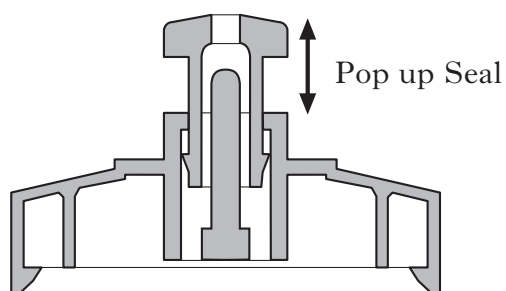
- | | |
|--|----------|
| (a) Outline a product specification for these types of chair. | 6 |
| (b) Justify the use of the materials used in the production of both chairs. | 6 |
| (c) Give four reasons why these chairs are suitable for mass production. | 4 |
| (d) Describe the steps that the designers and manufacturers of these chairs could take to ensure that these products remain cost effective in a competitive marketplace. | 4 |
| (e) Describe the appeal of both chairs from a consumer's viewpoint. | 4 |
| (f) Explain the ergonomic issues that would affect the design of these chairs. | 6 |

Total for Section A (30)

[Turn over

SECTION B

2. A plastic bottle and lid for use on a bicycle is shown below.



The bottle was manufactured by the process of blow moulding and the lid components were manufactured by the process of injection moulding.

- (a) Justify why **each** of these two processes was used to manufacture these components. 4
- (b) State and justify a plastic that could be used for the bottle or cap. 2

The bottle is held onto a bicycle frame in the bottle cage shown below.



- (c) Describe the issues that the designer would have to consider when designing the bottle cage. 2

(8)

3. Portable music players, such as the ones shown below, have undergone many changes over recent years with many designs utilising new technology.



- (a) Describe how design issues have affected the design of portable music players with regard to:

(i) technological opportunity;

2

(ii) obsolescence.

2

(Use **two** different issues for each of your answers to (i) and (ii).)

- (b) Discuss the **disadvantages** for a company when launching a product that makes use of new technology.

2

(6)

[Turn over

4. A table is shown below.



(a) Describe the benefits of using MDF with plastic laminate for the table top.

3

(b) Explain why a solid timber has been used for the legs and cross rails.

2

Parts of the table such as the edge profile on the top and shelf are manufactured using a CNC router.

(c) Describe the benefits of using this process when mass producing furniture.

3

(8)

5. The body and side panels on the car shown below were manufactured using the process of press-forming.



- (a) Explain why press-forming is a suitable process for the manufacture of these panels.

3

Corrosion of car parts can be a problem.

- (b) Describe how manufacturers attempt to reduce or eliminate this problem.

4

“Just in Time” production is used by car manufacturers to reduce costs.

- (c) With reference to car manufacture, describe “Just in Time” production.

3
(10)

[Turn over for Question 6 on *Page eight*

6. Prototypes are used during the design of products.

- (a) Explain why it would be necessary to prototype products before manufacture.

3

A strap with “snap-together” clip is shown below.

During the design and development process, a series of prototypes for the clip were made using rapid prototyping.



- (b) Describe the benefits that **rapid prototyping** offers when developing this clip.
- (c) State the name of a rapid prototyping process that could be used to test the **final** design of the clip and **justify** its suitability.

3

2

(8)

Total for Section B (40)

[END OF QUESTION PAPER]

ACKNOWLEDGMENTS

Section A Question 1 – Picture of ‘Ant’ Chair by Arne Jacobsen is reproduced by kind permission of Fritz Hansen.

Section B Question 3 – Picture of Sony Walkman is reproduced by kind permission of Sony United Kingdom Limited.

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Section B Question 5 – Picture of Volvo car is reproduced by kind permission of Volvo Cars UK Ltd.