

X211/701

NATIONAL
QUALIFICATIONS
2009

FRIDAY, 22 MAY
1.00 PM – 4.00 PM

PRODUCT DESIGN
ADVANCED HIGHER

100 marks are allocated to this paper.

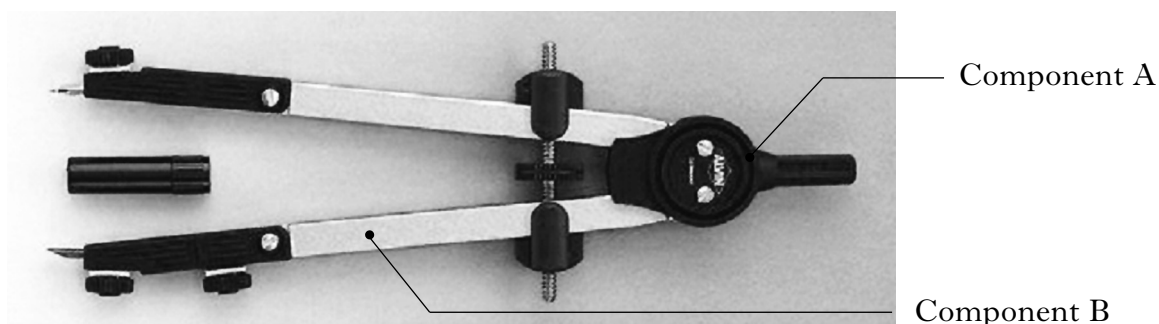
Where appropriate you may use sketches to illustrate your answer.

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



Attempt ALL questions.

1. A pair of compasses designed to suit a specific market niche is shown below.



Component A has been manufactured using injection moulding.

- (a) (i) Justify why this manufacturing process was chosen to produce Component A. 2
- (ii) Specify a suitable material for Component A and explain why it is suitable. 3

Component B has been manufactured by pressure die casting an alloy.

- (b) (i) Describe the advantages or disadvantages that the manufacturer would derive from pressure die casting this component. 3
- (ii) Describe benefits of using alloys. You should refer to examples to illustrate your answer. 4

High levels of automation have been used to produce the low cost compasses shown below.



- (c) Explain why these compasses are suited to automated methods of production. 3

The two pairs of compasses are aimed at different markets.

- (d) Identify and justify a suitable market for each pair of compasses. 2

(17)

2.

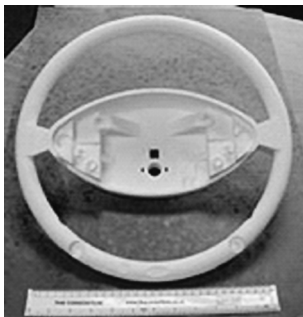
Marks



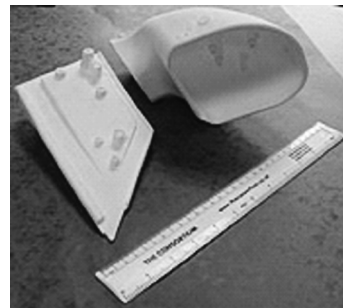
A variety of ergonomic data is used during the design of the interior of a car.

- (a) Explain why cars are not designed for the “average” user. 4
- (b) Describe how the consideration of physiology and psychology may have impacted on the design of the car’s interior. 4

To maintain a competitive edge, car manufacturers use rapid prototyping in the development and production of their cars.



Steering Wheel Rapid Prototype



Wing Mirror Rapid Prototype

- (c) Describe the advantages rapid prototyping offers designers during the development of new cars. 4

Rapid prototyping is now used to produce jigs which assist in the assembly of the cars.

- (d) Describe the advantages of using jigs during the assembly process. 2
- (14)

[Turn over

3.



Marks

When choosing outdoor playframes, local authorities are particularly concerned with economics and safety.

(a) Describe how **three** of the design issues listed below will impact on economics and safety:

- Durability
- Aesthetics
- Function
- Maintenance
- Manufacture.

9

(b) Describe how the manufacturer of the playframe would ensure that the product meets the needs of its target market.

4

(13)

4. The XO-1 laptop shown below has been launched by One Laptop Per Child (OLPC), an organisation set up to provide computer access to children in the developing world. It was developed through the close collaboration of over 12 international companies, based in different locations across the globe from USA to China.

Marks



- (a) Describe the benefits offered by collaboration when researching, developing, producing and distributing a product such as the XO-1 laptop.

6

The XO-1 laptop has been designed to be priced at under £100.

- (b) Explain the steps that could have been taken to minimise the cost of the **manufacture** of this product.

6

The development of the XO-1 laptop was a non-profit venture.

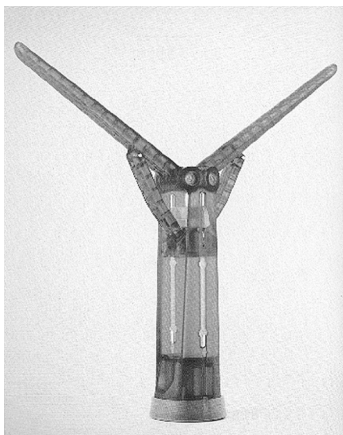
- (c) Describe the benefits a company would gain through their involvement with this type of project.

5

(17)

[Turn over

5.



Can Crusher
by Julian Brown



Sardine Tin Drawers
by Michael Marriott



Sustainable forest

Recycling, re-using and replanting are strategies which are beneficial to the environment.

(a) Identify and describe a **disadvantage** associated with each of these strategies. 3

(b) Describe changes in products which have resulted due to pressure from government, manufacturers and society. You should refer to specific products to support your answer. 6

Environmentally friendly or “green” products could be defined as niche products. If these products are to have a bigger impact on our society and the environment this niche market must be expanded.

(c) Describe marketing, promotional and selling techniques which companies could use to increase sales of green products. 6

(15)

6. The modern desk lamp has evolved through a number of key stages, some of which are highlighted below. *Marks*



Describe how a product or products with which you are familiar have been improved by:

- | | |
|--|-------------|
| (a) changes and advances in materials; | 3 |
| (b) changes and advances in technology; | 3 |
| (c) changes and advances to manufacturing processes and systems; | 3 |
| (d) changes in society. | 3 |
| | (12) |

[Turn over for Question 7 on *Page eight*

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

- (a) *“I never design a building before I’ve seen the site and met the people who will be using it.”* Frank Lloyd Wright

Discuss the importance of defining the problem and considering the target market in design. You should use examples to support your answer.

12

OR

- (b) Designer Andy Rutledge states *“Compromised design is the refuge of the inept and weak-minded. It can be described in sugar-coated terms and even associated with lofty ideals for the purpose of misdirection, but compromise is nothing less than failure.”*

Discuss whether compromise should be considered failure or is necessary to the design process. You should use examples to support your answer.

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(12)

[END OF QUESTION PAPER]

ACKNOWLEDGEMENTS

Question 1—Photograph of a pair of Alvin compasses. Permission is being sought from Alvin & Company Ltd.

Question 2—Photograph is reproduced by kind permission of Alfa Romeo UK Ltd/Fiat Group Automobiles UK Ltd.

Question 4—Two photographs. Permission is being sought from One Laptop per Child.

Question 5—Photograph of Can Crusher by Julian Brown is reproduced by kind permission of Julian Brown RDI.

Question 5—Photograph of Sardine Tin Drawers by Michael Marriott is reproduced by permission of Michael Marriott.