

# **X211/12/01**

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NATIONAL  
QUALIFICATIONS  
2014

TUESDAY, 27 MAY  
9.00 AM – 11.00 AM

PRODUCT DESIGN  
HIGHER

70 marks are allocated to this paper.



**Attempt all questions**

**SECTION A**

1. Two cooling fans are shown below. Both have been designed for use in an office or domestic environment.



**Bladeless Cooling Fan (remote controlled)**

- Body Material—ABS
- Remote Material—ABS
- Variable speeds and oscillating operation
- Power—65 Watts (mains operated)
- Height—1 Metre
- Weight—3.2 kg
- Air Multiplier™ technology—amplifies surrounding air 16 times to generate an uninterrupted flow of smooth air
- Dimmer-switch airflow control—precisely adjusts airflow power, without the limited settings of conventional fans
- Remote airflow control—changes airflow power and oscillation mode

**Retail price £299.99**

**Pedestal Cooling Fan**

- Blades—Stainless Steel Sheet
- Blade Guard—Plastic Coated Mild Steel Mesh
- Body/Stem and Base—Chromed Mild Steel
- Gears/Fasteners—Nylon
- 3 speed settings and oscillating operation.
- Power—50 Watts (mains operated)
- Height—0.7 to 1.1 metre
- Weight—3.5 kg

**Retail price £60.00**



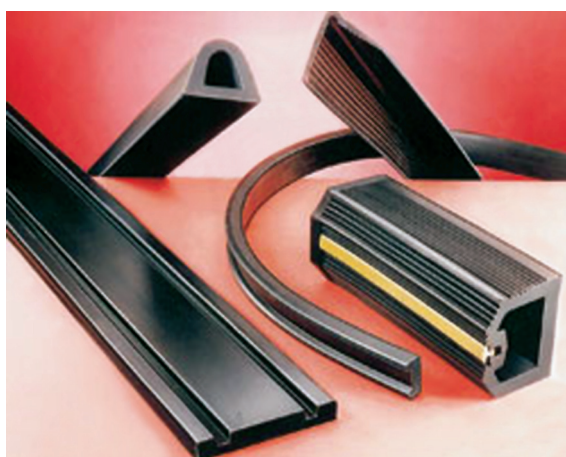
1. (continued)

(a) Write a product specification for <b>one</b> of the fans in relation to its target market.	6
(b) Justify the choice of materials used to produce <b>both</b> fans.	6
(c) Identify and justify the production processes that could be used to manufacture <b>both</b> fans.	6
(d) Describe how the design of <b>both</b> fans has been influenced by functional issues.	4
(e) Describe the appeal of <b>both</b> fans from the consumer's viewpoint.	4
(f) Explain the health, safety and environmental issues associated with the production and use of these fans.	4
<b>Total for Section A</b>	<b>(30)</b>

[Turn over

## SECTION B

2. A rubber composite material has been used in the production of the car park ramp shown below.



- (a) Identify **and** justify the manufacturing process for products such as these.

2

- (b) Describe **three** advantages of using composite materials.

3

(5)

3. The aluminium ladder shown below has been developed through *technology transfer*.



- (a) Describe what is meant by *technology transfer*. 1
- (b) Explain why aluminium is a suitable material for the manufacture of this product. 2
- (c) Explain how safety has influenced the design of this product. 3
- (6)

**[Turn over**

4. The Airbus A380 passenger jet shown below was comprehensively tested and evaluated using **scale models**, **computer simulations** and **prototypes** before being allowed to carry passengers.



- (a) Explain why scale models and computer simulations are used in the pre-production stages of design. 2
- (b) Some parts of the A380 can only be tested using a prototype.
- (i) Explain what a prototype is. 1
- (ii) Explain **three** aspects of the A380 that could **only** be tested using prototypes. 3
- (iii) Describe how each of these aspects could be tested. 3

(9)



5. Many home owners install decking in their gardens.



A softwood has been used in the manufacture of the spindles.

- (a) Describe **two** issues related to the use of softwoods for this product.

2

The spindles have been produced using a CNC lathe.



- (b) Explain **two** benefits of using this process to produce the spindles.

2

The spindles are manufactured in batches.

- (c) Describe **two** issues for the manufacturer of using batch production for these components.

2

(6)

[Turn over

6. The Baby Jogger City Mini Stroller shown below is an award winning buggy.



Ergonomics is a key issue that would be considered by the designer.

- (a) With specific reference to physiological issues describe **four** aspects that would have been considered in the design of the buggy.

4

The buggy is also produced in a twin version.



- (b) Explain **two** ways that this version will benefit the consumer.

2

- (c) Explain the advantages to the manufacturer of producing two versions of the same product.

3

(9)



7. The products shown below are protected by Intellectual Property Rights (IPR).



This image has been removed due to copyright issues.

Describe how companies could use aspects of IPR to protect their products.

5

(5)

**Total for Section B (40)**

[END OF QUESTION PAPER]

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## ACKNOWLEDGEMENTS

Section A Question 1—Image of Dyson Bladeless Cooling Fan.

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Section B Question 6—Images of Baby Jogger City Mini Stroller (single version and twin version).

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