X211/12/01

NATIONAL QUALIFICATIONS 2013

WEDNESDAY, 29 MAY
1.00 PM – 3.00 PM

PRODUCT DESIGN
HIGHER

70 marks are allocated to this paper.

PB X211/12/01 6/8060

Attempt all questions

SECTION A

1. Each of the lawnmowers shown below have been designed for a well known high street DIY retailer.

Electric Hover Mower

Blade—Mild Steel
Handle—Plastic coated Mild Steel
Body—Polypropylene
Gears/Fasteners—Nylon
Cable Length—20 Metres

Weight—4·2 kg

Retail price £29·99

Cylinder Mower (Manually Operated)

Blade—HSS (Tool Steel)
Handle—Foam Rubber coated Aluminium
Body—Mild Steel
Gears/Fasteners—Nylon
Wheels—Metal Alloy
Grass Catcher—Nylon with Polypropylene base

Weight—7·3 kg

Retail price £119·50

Marks

1. (continued)

(*a*) Write a product specification for **one** of the lawnmowers in relation to its target market. **6**

(*b*) Justify the choice of materials used to produce **both** lawnmowers. **6**

(*c*) Identify and justify the production processes that could be used to manufacture **both** lawnmowers. **6**

(*d*) Explain the ergonomic issues associated with **both** lawnmowers. **4**

(*e*) Describe the appeal of **both** lawnmowers from the consumer's viewpoint. **4**

(*f*) Describe how the design of **both** lawnmowers has been influenced by functional issues. **4**

Total for Section A **(30)**

[Turn over

SECTION B

2. The body of the adjustable spanner shown below is made by the process of drop forging.

(*a*) Explain why drop forging is a suitable process for producing the body of this adjustable spanner. **1**

(*b*) State **two** features that would indicate that this product was made by drop forging. **2**

(*c*) State a suitable material that could be used for the body of the spanner and give a reason for your choice. **2**

(5)

Marks

3. Aesthetics is a major consideration in the design of a product such as the Sky+ remote control shown below.

Describe where **four** aspects of aesthetics have influenced the design of the Sky+ remote control. **4**

(4)

[Turn over

Marks

4. A designer has been asked to produce concepts for a new style of domestic kettle.

Specification

Stainless steel body
Programmable timers
Protective thermal security system stops overheating
Save up to 25% more energy
Display integrated in the handle
Electronic temperature control

Bugatti Vera Electric Kettle—£189·95

The kettle shown above has been designed for a niche market.

(*a*) With reference to the kettle explain the term "**niche market**". **2**

Another selling point is that the kettle could be recycled easily.

(*b*) Describe the steps the designer could take to make the kettle easier to recycle at the end of its working life. **2**

The kettle could be manufactured using batch production techniques.

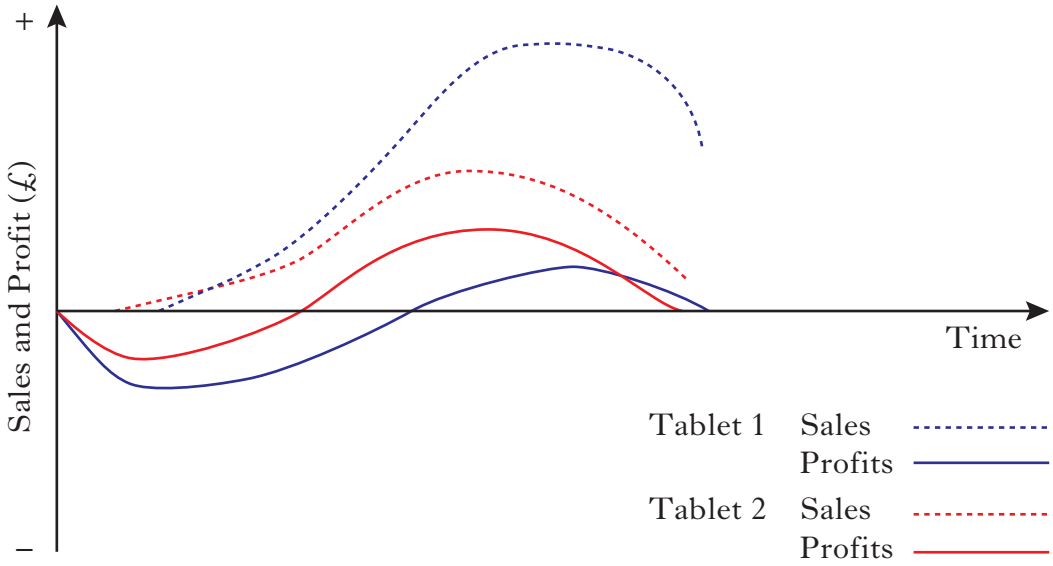
(*c*) Describe the considerations the manufacturer would need to make before deciding upon this production system. **2**

(6)

Marks

5. The graph shown below has been used to predict and compare how well **two** new graphics tablets will sell.

Product Life Cycle (Sales and Profit)



(*a*) Describe what steps a manufacturer could take to reduce the time required to introduce a product onto the market. **2**

(*b*) From the graph above state which of the two graphics tablets would be commercially viable and explain your reasons for this choice. **3**

(*c*) Describe how a company could extend the sales life of a product. **2**

(7)

[Turn over

Marks

6. The carcass of the kitchen cabinet shown below has been constructed using manufactured boards and knock down fittings.

(*a*) Explain the benefits to the **manufacturer** of using knock down fittings instead of traditional joining methods. **2**

The door of the kitchen cabinet is manufactured using solid timber.

(*b*) Explain the benefits to the **consumer** of using solid timber for the cabinet doors. **2**

(*c*) Describe the obsolescence issues associated with modern fitted kitchens. **2**

(6)

Marks

7. During design development many designers use CAD software to simulate the behaviour of products.

(*a*) Explain the benefits of computer simulation over user trials with prototype models. **2**

(*b*) A prototype model of a car disc brake was produced using Fused Deposition Modelling.

(i) Name a suitable material that could be used for the Fused Deposition Modelling process. **1**

(ii) State **one** advantage and **one** disadvantage associated with Fused Deposition Modelling. **2**

(5)

[Turn over for Question 8 on *Page ten*

Marks

8. A company has commissioned a designer to produce a range of kitchen accessories suitable for users with limited manual dexterity.

(*a*) Explain how the designer could identify the needs of the user group before developing concept ideas. **1**

(*b*) Describe the physiological needs the designer might find within the user group. **3**

(*c*) Describe **two** idea generation techniques that could be used to help produce concept ideas. **2**

(*d*) Describe a technique that could be used to present the design concepts to the client. **1**

(7)

Total for Section B (40)

[*END OF QUESTION PAPER*]

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ACKNOWLEDGEMENTS

Section B Question 3—Image of a Sky+ remote control. Permission is being sought from British Sky Broadcasting Group plc.

Section B Question 4—Image of Bugatti Vera kettle is reproduced by kind permission of Ilcar di Bugatti S.r.l.