Fill in these boxes and read what is printed below.

Full name of centre  
Town  
Forename(s)  
Surname  
Number of seat  
Date of birth  
Year  
Scottish candidate number  

Total marks — 60  
SECTION 1 — 24 marks  
Attempt ALL questions.

SECTION 2 — 36 marks  
Attempt ALL questions.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Use blue or black ink.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.
SECTION 1 — 24 marks
Attempt ALL questions

1. A chess box is shown below.

(a) Hardwood was used for some of the squares of the chess board.
   (i) State the name of a hardwood that could have been used for the squares.  1

   ______________________________________________________________

   (ii) Describe two benefits of using hardwoods for the manufacture of this product.  2

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   ______________________________________________________________

(b) A comb joint has been used at each corner.
   State the name of two alternative joints that could have been used at each corner.  2

   ______________________________________________________________
   ______________________________________________________________

(c) Clear varnish was used as a surface finish for the chess box.
   (i) Describe two benefits of using clear varnish as a surface finish for the chess box.  2

   ______________________________________________________________
   ______________________________________________________________
1. (c) (continued)

(ii) Describe two stages in the preparation of the wood before applying the varnish.

The plastic tray shown below was vacuum formed and is used to hold the chess pieces. The wooden pattern used in the process is also shown.

(d) Explain the reason for the following features in the wooden pattern.

(i) Rounded corners

(ii) Sloping sides

(iii) A thermoplastic was used for the tray.

Describe two benefits of using a thermoplastic for this type of product.

[Turn over]
1. (continued)

(e) The aluminium handle shown below was manufactured using a centre lathe.

Describe how each of the following processes would be carried out on the centre lathe to manufacture the handle.

(i) Chamfering

(ii) Parallel turning

(iii) A change of speed may be required when using a centre lathe.

State two reasons why a change in lathe speed may be necessary.
1. (continued)

(f) The aluminium chess pieces shown below were commercially produced by the process of die casting.

(i) State two reasons for using aluminium for the chess pieces.

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(ii) State three benefits of using die casting to manufacture the chess pieces.

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Total marks 24
2. The 2012 Olympic success of Team GB caused an increased interest in all forms of cycling for all ages.

(a) Describe how ergonomics has influenced the design of bicycles.
2. (continued)

(b) Before producing a design specification for a bicycle, the designer would have researched various design factors.

Explain why the following design factors would be researched when designing bicycles.

(i) Durability

(ii) Ease of maintenance

(iii) Aesthetics

Total marks 9

[Turn over
3. The environmental impact of a product can often influence our buying decisions.

Explain ways in which designers could reduce the environmental impact of their products.

(You may wish to refer to products with which you are familiar.)
4. Designers use a range of graphic techniques to communicate their designs.

(a) State the name of one graphic technique that the designer may use at each of the following stages of the design process and explain why it would be suitable.

(A different graphic technique must be used for each stage.)

(i) Initial ideas

(ii) Planning for manufacture
4. (continued)

(b) Designers often use models as well as a range of graphic techniques. State the name of two modelling materials and explain why each would be suitable for building models.

(A different explanation must be given for each material.)

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Total marks 8
5. A stainless steel colander is shown below.

(a) (i) Give two reasons why stainless steel would be suitable for the colander.

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(ii) The colander was mass produced.
    Describe two benefits to the manufacturer of mass production techniques.

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[Turn over
5. (continued)

(b) Colanders can also be manufactured from plastic as shown below.

State the name of a suitable process for manufacturing colanders from plastic.  

(c) Manufacturers are increasingly using CNC and CADCAM technologies to make their products.

Describe the impact that these technologies have on the manufacturer.  

Total marks 8
6. An electric razor is shown below.

The manufacturer wishes to carry out an evaluation of the razor.

(a) Describe a suitable user trial to evaluate the ergonomics of the razor.

(b) State two key questions that would be included in a survey to evaluate the aesthetics of the razor.

[Turn over for Question 6 (c) on Page fourteen]
6. (continued)

(c) There are a wide variety of razors available on the market today.

With such a large selection, designers need to find ways of marketing their product in order to make it stand out from the competition.

Describe two marketing techniques that a design team may use to promote their product.

(d) Designers often have to generate new ideas to stay ahead of their competitors.

Describe one idea generation technique that they could use.

Total marks 8
ACKNOWLEDGEMENTS

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Section 2 Question 2—Image of a Team GB bicycle.

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