

HIGHER

DESIGN AND MANUFACTURE



SKILLS, KNOWLEDGE AND UNDERSTANDING

- research skills
- skills in designing products
- knowledge and understanding of materials and commercial manufacture
- knowledge and understanding of design factors
- an understanding of the impact of design and manufacturing technologies on society, the environment and the world of work

The course assessment has two components.

- Component 1: question paper 80
- Component 2: assignment 90

QUESTION PAPER

The question paper has two sections:

- **Section I** has 25 marks and consists of a single question based on the design and manufacture of two similar products. The question focuses on design factors and the justification of materials and manufacturing processes used in their commercial manufacture. It follows a similar format each year and gives candidates an opportunity to demonstrate:
 - knowledge and understanding of how products are influenced by materials and processes
 - knowledge of how products are influenced by design factors

SECTION 1 — 25 marks
Attempt ALL questions

1. Two children's diggers are shown below with product information.

Playground sand-digger

Materials

tubular stainless steel frame
textured ABS seat
nylon bearings

Additional details

360° rotation
permanently fixed to ground
vandal proof nuts/bolts used
designed for commercial use
Price — £499.00



Garden digger

Materials

tubular mild steel frame (painted)
solid polypropylene seat
hollow ABS wheels
mild steel scoop (painted)
rubber handles

Additional details

self-assembly (tools included)
designed for domestic use
Price — £47.99

1. (continued)

MARKS

- | | |
|--|---|
| (a) Explain why the materials chosen are suitable for these products.
<i>(You must give six different explanations.)</i> | 6 |
| (b) Name three appropriate manufacturing processes used in the production of the diggers and explain why each one is suitable. | 6 |
| (c) Describe how anthropometrics and physiology have influenced the design of the diggers. | 4 |
| (d) Describe how the design of the diggers have been influenced by function and safety. | 5 |
| (e) Describe how production and planning systems could be used to improve efficiency during the manufacture of the diggers. | 4 |

[Turn over

QUESTION PAPER

The question paper has two sections:

- **Section 2** has 55 marks and consists of six or seven questions that focus on the design and manufacture of commercial products and the impact design and manufacturing technologies have on society, the environment and the world of work.

3. A bicycle is shown below.

MARKS



Standard components have been used in the assembly of this bicycle.

(a) Outline two benefits to the consumer of using standard components. 2

This bicycle was designed using CAD software.

(b) Outline the benefits of using CAD software in the design of products such as the bicycle. 3

This bicycle was manufactured using fully automated production methods.

(c) Explain the impact of fully automated production methods on the workforce. 2

[Turn over

7. With reference to a product(s) with which you are familiar.

MARKS

- (a) (i) Describe methods that could be used to identify the materials used in a product. 4
(ii) Describe how manufacturing features are used to aid accurate and efficient assembly. 2

Manufacturers are now more aware of the negative impact their products can have on the environment.

- (b) Describe steps that manufacturers can take to reduce the environmental impact of their products. 4

8. A variety of models can be used to gain information during the design of products. Describe how models may be used during the design of products. 8
(You should make reference to different types of models, stages of the design process and information gained.)

[END OF QUESTION PAPER]

Acknowledgement of copyright

Question 1 (Silver digger) daseaford/shutterstock.com

Question 1 (Red digger) Image of Legler "Digger on Wheels".

SQA has made every effort to trace the owners of copyright of this item and seek permissions. We are happy to discuss permission requirements and incorporate any missing acknowledgement. Please contact question.papers@sqa.org.uk.

Question 2 Veniamin Kraskov/Shutterstock

Question 3 Bike Wheel - tatui suwat / Shutterstock.com

Full Bike - iamlukyeee / Shutterstock.com

Question 4 Image of prosthetic leg is taken from www.lumecluster.com.

ASSIGNMENT

12 A3 pages

-
- carrying out research into a given brief 5 marks 2 pages
 - producing a specification 3 marks
 - generating initial ideas 8 marks 3 pages
 - exploring ideas 12 marks 3 pages
 - refining ideas 6 marks 2 pages
 - applying knowledge and understanding of materials and assembly processes 10 marks
 - applying knowledge and understanding of design 12 marks
 - applying graphic techniques 12 marks
 - applying modelling techniques 8 marks
 - producing a plan for commercial manufacture 6 marks 1 page
 - demonstrating practical modelling skills 8 marks 1 page
- 

