



National
Qualifications
2023

X819/76/11

Design and Manufacture

TUESDAY, 30 MAY

1:30 PM – 3:45 PM

Total marks — 80

SECTION 1 — 25 marks

Attempt ALL questions.

SECTION 2 — 55 marks

Attempt ALL questions.

Write your answers clearly in the answer booklet provided. In the answer booklet you must clearly identify the question number you are attempting.

Use **blue** or **black** ink.

Before leaving the examination room you must give your answer booklet to the Invigilator; if you do not, you may lose all the marks for this paper.



* X 8 1 9 7 6 1 1 *

SECTION 1 — 25 marks

Attempt ALL questions

1. Two pedal go-karts are shown below with product information.

Commercial go-kart

Materials

plastic coated tubular mild steel frame

galvanised mild steel wheels

solid textured polypropylene seat

PVC steering wheel

Additional details

hand operated lockable brake

air filled tyres

front and rear reflectors

adjustable seat position

Price - £549.99



Domestic toy go-kart

Materials

tubular mild steel frame (painted)

hollow ABS wheels

solid polypropylene seat

PVC steering wheel

polystyrene mudguards
and front panel

Additional details

hand operated brake

self-assembly required

Price - £89.99

1. (continued)

- (a) Explain why the materials chosen are suitable for these products. 6
(*You must give six different explanations.*)
- (b) Name **three** appropriate manufacturing processes used in the production of the go-karts **and** explain why each one is suitable. 6
- (c) Describe how the following have influenced the design of the go-karts 5
• function
• safety.
(*To attract full marks, you must reference both function and safety in your answer.*)
- (d) Describe how aesthetics has influenced the design of the go-karts. 4
(*You must refer to a **range** of aesthetic aspects.*)
- (e) Explain the benefits and drawbacks for the **manufacturer** of using standard components during the production of the go-karts. 4

[Turn over

SECTION 2 — 55 marks
Attempt ALL questions

2. A carabiner used in mountaineering and adventure sports is shown below.



- (a) Identify a suitable material that could be used for the carabiner and explain why it is appropriate. 3

The carabiner has been manufactured using the process of drop forging.

- (b) Explain why drop forging is a suitable process for the production of products such as the carabiner. 2

CAD modelling was used during the design of the carabiner.

- (c) Explain the benefits of using CAD modelling during the design of the carabiner. 2

3. A car interior is shown below.



- (a) Describe how ergonomics has influenced the design of the car interior. 6
(To attract full marks, you must cover all **three** aspects of ergonomics in your answer.)

Ergonomists play a lead role in the design of products.

- (b) Describe the role of **two other** members of a design team. 4

Sub-contractors can be used in the development of products.

- (c) Explain one benefit **and** one drawback of using sub-contractors. 2

[Turn over

4. Technology push and market pull often influence products.

(a) Describe how products with which you are familiar have been influenced by:

(i) Technology push.

2

(ii) Market pull.

2

Market research is carried out as part of the design process.

(b) Describe **two** appropriate methods of carrying out research into the needs of the target market.

4

Planned obsolescence is often incorporated into products.

(c) Describe what is meant by planned obsolescence **and** give an example of how this may have influenced the design of products.

2

5. Swimming goggles are shown below.



The seal and the strap are manufactured from elastomers.

(a) Explain why elastomers are suitable for these parts.

2

Production and planning systems are used to improve efficiency when manufacturing products.

(b) Describe how production and planning systems are used to improve efficiency during the manufacture of products.

4

Companies use a variety of marketing techniques to maintain or improve their market share.

(c) Describe the marketing techniques that companies could use to maintain or improve their market share.

2

6. Different methods can be used to identify materials in products.
- (a) Describe methods that could be used to identify materials. 3
- Different assembly methods are used in the commercial manufacture of products.
- (b) Outline the factors that would influence the choice of assembly method used. 3
- Manufacturers can use recycled or recyclable materials to reduce the impact of their products on the environment.
- (c) Describe **other** ways in which designers and manufacturers can reduce the environmental impact of their products. 4
7. Designers use a variety of graphic techniques throughout the design process.
- Explain why a variety of graphic techniques are used at different stages of the design process. 8
- (You should reference different types of graphic techniques and where they are used in the design process.)*

[END OF QUESTION PAPER]

[BLANK PAGE]

DO NOT WRITE ON THIS PAGE

Acknowledgement of copyright

Question 1 Image of commercial go-kart is taken from [https://mytoys.scene7.com/is/image/myToys/ext/11204940-02.jpg?\\$rtf_mt_prod-mainzoom_xl\\$](https://mytoys.scene7.com/is/image/myToys/ext/11204940-02.jpg?$rtf_mt_prod-mainzoom_xl$)

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.

Image of domestic toy go-kart is taken from https://www.jamb.ch/images/product_images/original_images/Go-Kart-Gokart-35kg-3-8-Jahre-Vor-und-R%C3%BCckw%C3%A4rtsgang-2500222-8-.jpg

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 Ondra Vacek/Shutterstock.com

lenina11only/Shutterstock.com

Question 3 SOUTHERNTraveler/Shutterstock.com

Question 5 FtLaud/Shutterstock.com