



National  
Qualifications  
2019

**X819/76/11**

**Design and Manufacture**

THURSDAY, 16 MAY

1:00 PM – 3:15 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.



## SECTION 1 — 25 marks

Attempt ALL questions

1. Two wheelchairs are shown with product information.



### **Collapsible manual wheelchair**

#### **Materials**

ABS adjustable footrests  
tubular mild steel frame and back wheels  
nylon collapsible seat  
aluminium front wheels

#### **Additional details**

assembled using standard components

**Price – £79.99**

### **Paralympic sports wheelchair**

#### **Materials**

carbon fibre back wheels  
stainless steel bumper and wings  
tubular aluminium frame  
nylon front wheels

#### **Additional details**

assembled using standard components  
defensive wheelchair for elite level performance

**Price – £4495.00**



bumper and wings

## 1. (continued)

- |   |   |
|---|---|
| (a) Explain why the materials chosen are suitable for these products.<br>(You must give <i>six different explanations</i> .)                | 6 |
| (b) Name <b>three</b> appropriate manufacturing processes used in the production of these wheelchairs and explain why each one is suitable. | 6 |
| (c) Describe how function has influenced the design of these wheelchairs.   | 5 |
| (d) Explain the benefits and drawbacks for the manufacturer of using standard components during the production of these wheelchairs.        | 4 |
| (e) Describe how anthropometrics and physiology have influenced the design of these wheelchairs.  | 4 |

[Turn over]

## SECTION 2 — 55 marks

Attempt ALL questions

2. The food packaging below was vacuum formed.



- (a) Explain why vacuum forming is a suitable process for the production of food packaging. 2
- (b) State the name of a suitable thermoplastic and explain why this thermoplastic is appropriate for the manufacture of food packaging. 3

The food packaging was manufactured using mass production systems.

- (c) Outline **two** considerations which would influence the selection of a production system. 2

3. Bose QC15 headphones are shown below.



The headphones were designed using CAD software.

(a) Outline the benefits of using CAD software in the design of these headphones.

3

Bose has a strong brand image.

(b) Explain the benefits of a strong brand image.

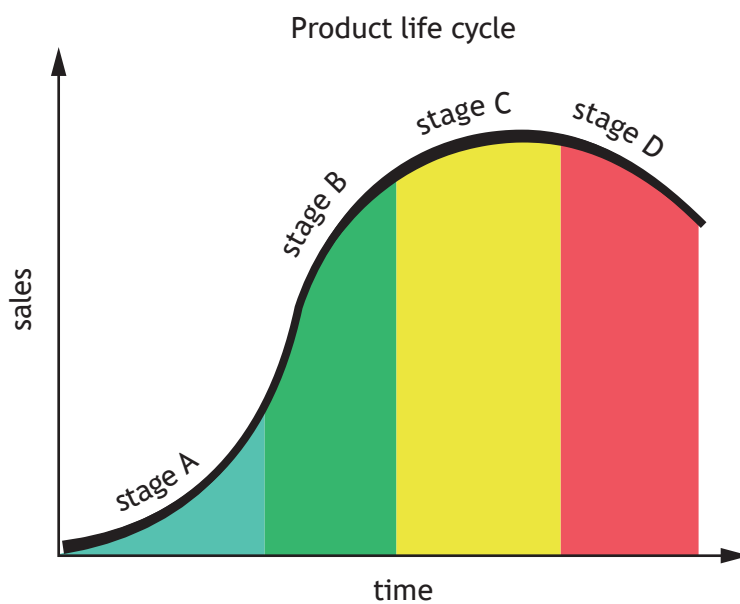
2

Bose has a patent which protects its Intellectual Property Rights (IPR).

(c) Identify another method of protecting IPR and give an example of what it would be used to protect.

2

Products such as the Bose headphones go through a product life cycle as shown in the graph below.



(d) Describe **three** of the stages of the product life cycle.

3

4. Two razors are shown below.



The aesthetics of the two razors are significantly different.

- (a) Discuss the aesthetics of the razors.

*(You must refer to **four** different aesthetic aspects.)*

4

Modelling may be used at different stages of the design process.

- (b) Identify **two** different types of model and describe how they could be used to advance the design of a product.

6

5. Different types of specifications are produced for a variety of reasons.

(a) Describe the purpose of the following types of specifications and give an example of the type of information found in each one.

(i) Product design specification 2

(ii) Technical specification 2

It is essential to carry out market research before any type of specification is produced.

(b) Describe appropriate methods of carrying out research into the needs of the target market. 2

Manufacturers are under pressure to produce environmentally friendly products.

(c) Describe how manufacturers could reduce the negative environmental impact of their products. 4

6. Various methods can be used to identify the materials in products.

(a) Describe a range of methods that could be used to identify materials. 4

Designers regularly include manufacturing features such as location pins, bosses and ribs/webs in products.

(b) Explain the purpose of location pins, bosses and ribs/webs. 4

Manufacturers frequently incorporate symbols and labels into their products as part of the production process.

(c) Describe two benefits of these symbols and labels for the consumer. 2

7. Designers use a variety of graphics during the design of new products.

Describe how graphics can be used effectively at different stages in the design process.

You should make reference to different types of graphics to support your answer. 8

**[END OF QUESTION PAPER]**

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**Section 1**

Question 1 BT.Suksan/shutterstock.com

Image of Roma Sport wheelchair.

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**Section 2**

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