National
Qualifications
2022 MODIFIED

X819/77/11 Design and Manufacture

TUESDAY, 10 MAY
9:00 AM – 11:15 AM

Total marks — 65

SECTION 1 — 15 marks

Candidates should attempt EITHER question 1 OR question 2.

SECTION 2 — 50 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.

MARKS

SECTION 1 — 15 marks

Candidates should attempt EITHER question 1 OR question 2

1. During your course you will have analysed the manufacture of a commercial product(s).

Identify a commercial product(s) you have analysed.

(a) Outline the features of parts of the product(s) that enabled you to identify the processes that had been used in their manufacture **and** explain why these processes were suitable. **6**

(b) Describe the method(s) you used to evaluate the **performance** of the product(s).

You should make reference to:

- the reasons for selecting the method(s)
- the actions or activities that took place
- the findings. **5**

(c) Describe how value for money influenced the product(s) you analysed. **4**

OR

2. During your course you will have researched the evolution of a commercial product(s).

Identify a commercial product(s) you have researched.

(a) Describe how the function **and** safety of the product(s) has changed during its evolution. **6**

(b) Describe how the evolution of the product(s) was influenced by **two** of the following:

- society
- external factors
- designers
- technology. **6**

Products will continue to evolve.

(c) Describe possible future developments in the product(s) you have researched and explain why they are likely to happen. **3**

MARKS

SECTION 2 — 50 marks

Attempt ALL questions

3. The 'Snoweel', designed by Kuan Yu Lin, is a collapsible wheelchair that operates efficiently on snow, ice and sand.

A range of materials was used for the 'Snoweel'.

(a) Discuss the issues that may have influenced the selection of materials used in different parts of the 'Snoweel'. **4**

A range of manufacturing and assembly processes was used for the 'Snoweel'.

(b) Discuss the issues that may have influenced the selection of processes for parts of the 'Snoweel'. **4**

The designer used composite materials for the wheels of the 'Snoweel'.

(c) Describe the possible benefits of using composite materials for the wheels. **2**

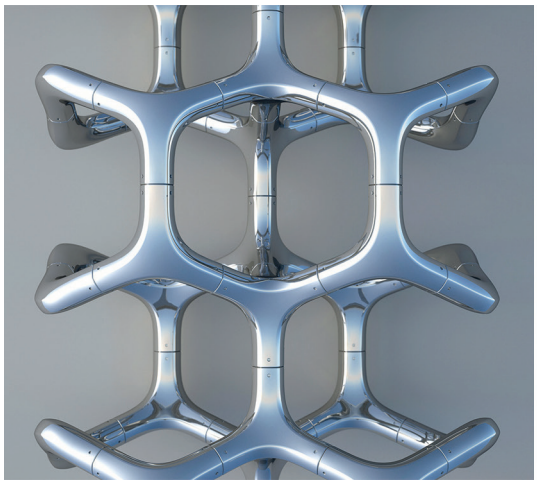
Several aspects of the 'Snoweel' were developed using models.

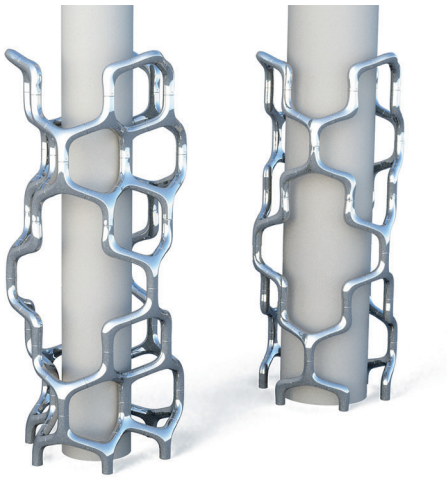
(d) Describe a range of ways in which modelling could have been used to develop the 'Snoweel'. **6**

[Turn over

MARKS

4. The ‘IVY radiator’, designed by Tomasz Orzechowski and Katrzyna Jakubowska, is a modular heating system.





It is important for designers of innovative products to protect their Intellectual Property Rights (IPR).

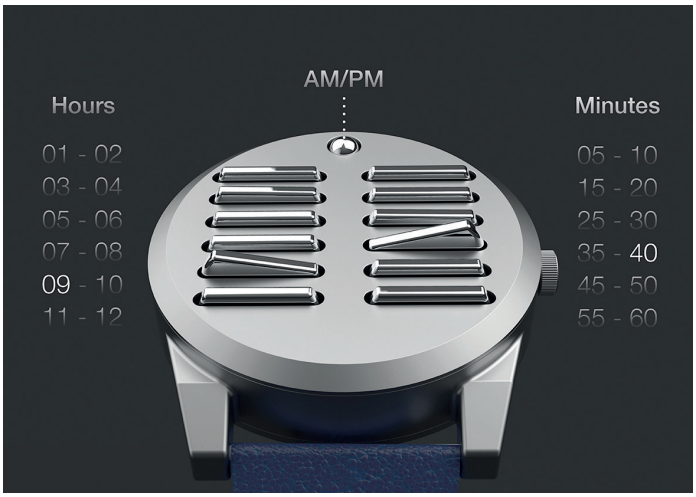
(a) Outline the key features of **one** suitable method of IPR that could be used to protect the intellectual property of the designers of the ‘IVY radiator’. **4**

The ‘IVY radiator’ components shown below were die-cast.

(b) Outline the features designers need to consider to ensure components can be successfully die-cast. **4**

MARKS

5. The 'Vivid-timepiece', designed by Jack Bates, reinvents how time is displayed, reshaping the way visually impaired individuals access the time.



During the development of the 'Vivid-timepiece' the designer had to resolve conflict between function and aesthetics.

(a) (i) Describe the challenges of achieving a balance between function and aesthetics. **2**

(ii) Describe methods which could be used to achieve a balance between function and aesthetics. **2**

The 'Vivid-timepiece' offers an inclusive solution as it is not only accessible to visually impaired individuals but also has an aesthetic appeal to a wider market.

(b) Discuss how other everyday products or spaces you are familiar with have been designed to be more inclusive. **4**

[Turn over

MARKS

6. The ‘Pod’, designed by Kin Pan Lo, is a bench for everyday use which can be quickly transformed into a lifeboat during floods.

Ergonomics would have been researched and considered in the design of the ‘Pod’, in both its bench and lifeboat form.

(a) Describe how physiology and psychology may have influenced the design of the ‘Pod’. **4**

Research was also carried out into a range of other design issues when developing the ‘Pod’.

(b) Outline information that may have been obtained about **two** different design issues **and** explain why it would be required. **4**

(*You must refer to design issues other than physiology and psychology.*)

MARKS

7. The ‘Stay Lock’, designed by a team from the University of Camerino, safely supports the load for delivery riders.

The increase in food delivery services has created a design opportunity for products like the ‘Stay Lock’.

(a) Describe **two** other ways in which design opportunities may be created. You should refer to products with which you are familiar. **4**

There is a possibility that new products may have to be recalled.

(b) Describe how a company can reduce the negative impact of a product recall. **3**

Following a recall, a company may attempt to relaunch a product.

(c) Describe how a company could ensure this relaunch is successful. **3**

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Section 2 Question 3	Images and reference to “Snoweel” by Kuan-Yu Lin. Reproduced by kind permission of Kuan-Yu Lin.
Section 2 Question 4	Images and references to the “IVY radiator” by Tom Orzechowski and Katrzya Jakubowska. Reproduced by kind permission of Tom Orzechowski and Katrzyna Jakubowska.
Section 2 Question 5	Images and reference to the “Vivid-timepiece” designed by Jack Bates. Reproduced by permission of Jack Bates.
Section 2 Question 6	Images and reference to “The Pod” by Kin Pan Lo. Reproduced by kind permission of Kin Pan Lo.
Section 2 Question 7	Images and reference to the “Stay Lock”. Reproduced by kind permission of The James Dyson Award team.