



National  
Qualifications  
2024

**X819/77/11**

**Design and Manufacture**

WEDNESDAY, 1 MAY

1:00 PM – 3:15 PM

**Total marks — 80**

**SECTION 1 — 30 marks**

Attempt ALL questions.

**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.



\* X 8 1 9 7 7 1 1 \*

## SECTION 1 — 30 marks

Attempt ALL questions

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

**Identify a commercial product(s) you have analysed and:**

- (a) Describe the method(s) you used to evaluate the product(s) and the conclusions you reached. 6

You will have identified materials and processes used in the manufacture of a product(s).

- (b) Discuss the suitability of the materials used to manufacture the product(s). 4

- (c) Discuss the suitability of the processes used to manufacture the product(s). 4

- (d) Describe the assembly method(s) used in the product(s) and the impact they may have on the environment. 3

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

**Identify a commercial product(s) you have researched and:**

- (a) Describe the evolution of the product(s), identifying reasons for changes in the product. 6

- (b) Explain why a change(s) to the product(s) was a success or failure. 3

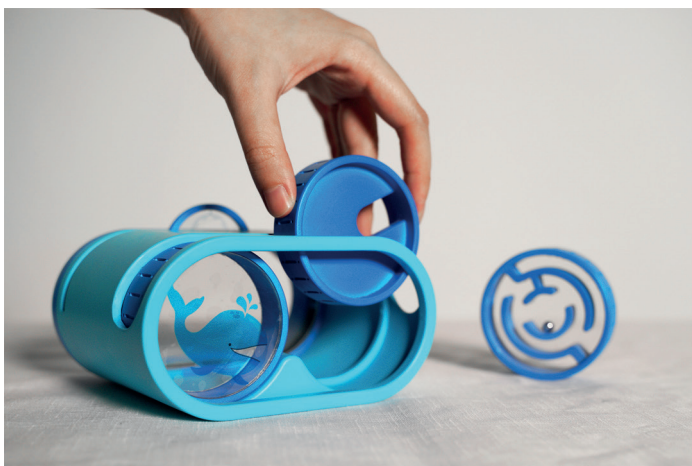
- (c) Describe the impact the product(s) may have had on society, the economy and the environment. 2

- (d) Describe how future developments in materials and technologies may influence the evolution of the product(s). 2

## SECTION 2 — 50 marks

Attempt ALL questions

3. E-YES is a game-based aid designed to improve the vision of children with visual impairments. It improves childrens' eye muscle strength by switching their vision between near and far objects.



A range of people would have been consulted to gain information when designing the E-YES.

- (a) Describe how the design of the E-YES may have been influenced by information gained from:
- medical professionals
  - children with visual impairments.

4

A range of models were used during the design of the E-YES.

- (b) Describe how modelling may have been used during the design of the E-YES.  
(You should refer to the types *and* purpose of models used.)

4

The E-YES is marketed towards children with visual impairments, parents and carers, and medical professionals.

- (c) Describe two marketing techniques that could be used to successfully reach this target market.

3

[Turn over

4. The WaterRower, designed by NOHRD, is a sustainably manufactured rowing machine that uses water for resistance training. The user pulls back on the handle, and the blades within the tank spin against the resistance of the water.



Ergonomics would have been considered when developing the WaterRower.

- (a) Describe how physiology may have influenced the design of the WaterRower. 4

Companies such as NOHRD can sell products at higher prices due to a strong brand image.

- (b) Outline other benefits of a strong brand image to companies and their customers. 3

A product recall could have a negative impact on a brand image.

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

5. The Airfryer XL was designed by Philips, a manufacturer of consumer electronics.



A growing demand for healthier lifestyles created a design opportunity for the Airfryer.

(a) Explain other reasons why design opportunities may occur. 3

The Airfryer was a diversification from Philips' normal product line.

(b) Describe the potential benefits and risks of diversification to a company. 3

Companies must quality assure their products to ensure they are manufactured to a high standard.

(c) Describe how Philips would ensure high quality during the manufacture of the Airfryer. 4

[Turn over

6. The Dragonfly is an electric transport vehicle.



Safety was considered during the design of the Dragonfly.

(a) Discuss how the design of the Dragonfly may have been influenced by safety. 4

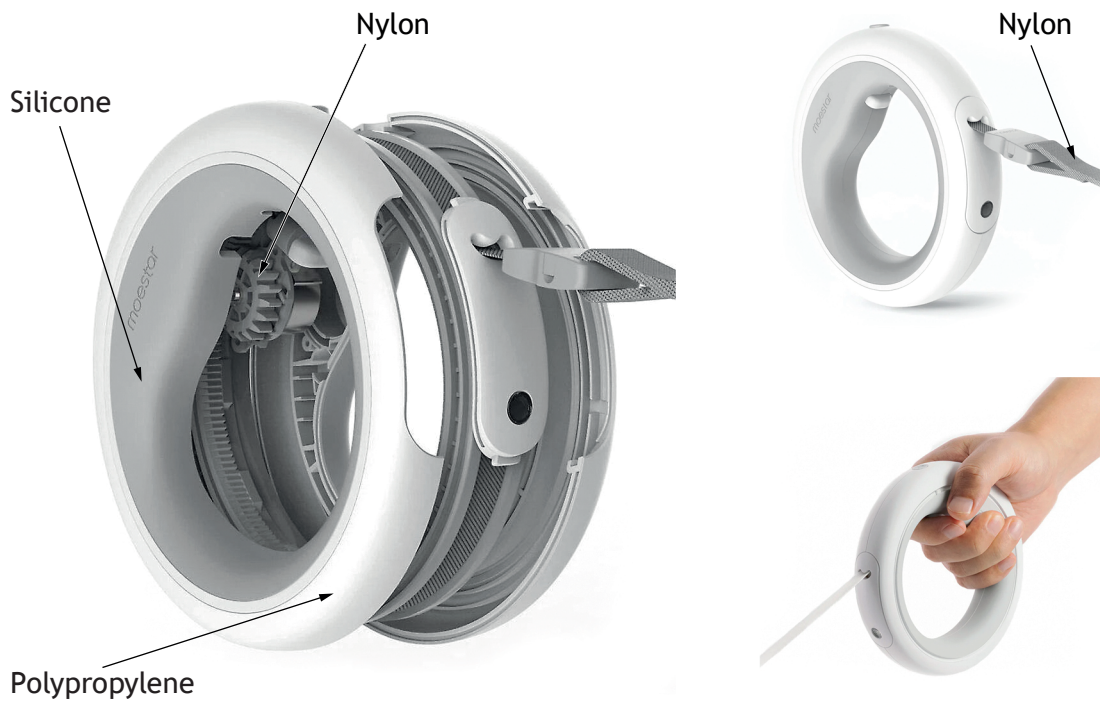
Companies may choose to sub-contract the manufacture of parts of their product.

(b) Explain the benefits and drawbacks of using sub-contractors when manufacturing products such as the Dragonfly. 4

Some of the Dragonfly's components were manufactured using drop forging.

(c) Outline **two** reasons why drop forging would be used to manufacture components. 2

7. The UFO Retractable Lead, designed by Moestar, is an extendable dog lead.



The designer would have considered a range of materials for the UFO Retractable Lead.

(a) Explain why the materials named above are suitable for the components of the lead.

4

The handle of the UFO Retractable Lead was two-shot injection moulded.

(b) Explain why the designer chose two-shot injection moulding to manufacture the handle.

2

Features of the mould design would have been considered to ensure successful injection moulding of the handle.

(c) Outline the features that should be considered in mould design.

3

[END OF QUESTION PAPER]

*Acknowledgement of copyright*

Section 2 Question 3 – Images and reference to “E-YES Amblyopia Trainer” designed by Chien-Chen Lai and Fang-Ping Hsu. Reproduced by kind permission of Chien-Chen Lai (Tosky Design Ltd.)

Section 2 Question 4 – Images and reference to “The WaterRower” designed John Duke. Reproduced by kind permission of WaterRower (UK) Ltd and NOHRD.

Section 2 Question 5 – Image and reference to “Philips Airfryer XL.”

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Section 2 Question 6 – Images and reference to “Dragonfly Hyperscooter” designed by D-Fly Group.

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Section 2 Question 7 - Images and reference to “UFO retractable leash” by moestar.

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