



National  
Qualifications  
2019

**X719/77/11**

**Design and Manufacture**

THURSDAY, 16 MAY

1:00 PM – 3:00 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 7 1 9 7 7 1 1 \*

SECTION 1 — 30 marks

Attempt ALL questions

In this section you will be asked questions relating to your knowledge and understanding of historical and current design influences.

- |   |    |
|---|----|
| 1. (a) Describe how developments in materials and manufacturing, and the impact of external factors have influenced the evolution of a product(s) with which you are familiar.  | 10 |
| (b) Describe how new and emerging technologies may impact on the evolution of the design and manufacture of products. You should refer to specific technologies in your answer. | 4  |
| A number of changes may be made to a product during its evolution.  |    |
| (c) Explain why changes made to products are not always a commercial success.   | 4  |
| Products can have both positive and negative impacts on society.  |    |
| (d) Describe how a product with which you are familiar has had <b>both</b> a positive and negative impact on society.   | 4  |
| The work of design movements and designers can often be identified by a range of features and characteristics.  |    |
| (e) Describe the features and characteristics that could be used to identify the work of a design movement or designer with which you are familiar.                             | 4  |
| A greater understanding and awareness of ergonomics has influenced the design and manufacture of products.  |    |
| (f) Describe how ergonomics has influenced the design and manufacture of a product(s) with which you are familiar.  | 4  |

SECTION 2 — 50 marks

Attempt ALL questions

2. Sled Legs, designed by Tiger studio, are a wearable twist on the common sledge. The Sled Legs provide greater control downhill and allow the user to remain hands free when climbing the hill.



Designers will have considered a range of materials for the Sled Legs.

- (a) Outline the issues that would have influenced the designer's choice of material for any **two** components of the Sled Legs.

4

The designer chose to vacuum form the shell of the Sled Legs instead of injection moulding them.

- (b) Explain why the designer chose vacuum forming instead of injection moulding.

3

A range of models can be used during the design process.

- (c) Describe how modelling may have been used to develop the Sled Legs. You should refer to the types and purpose of models used.

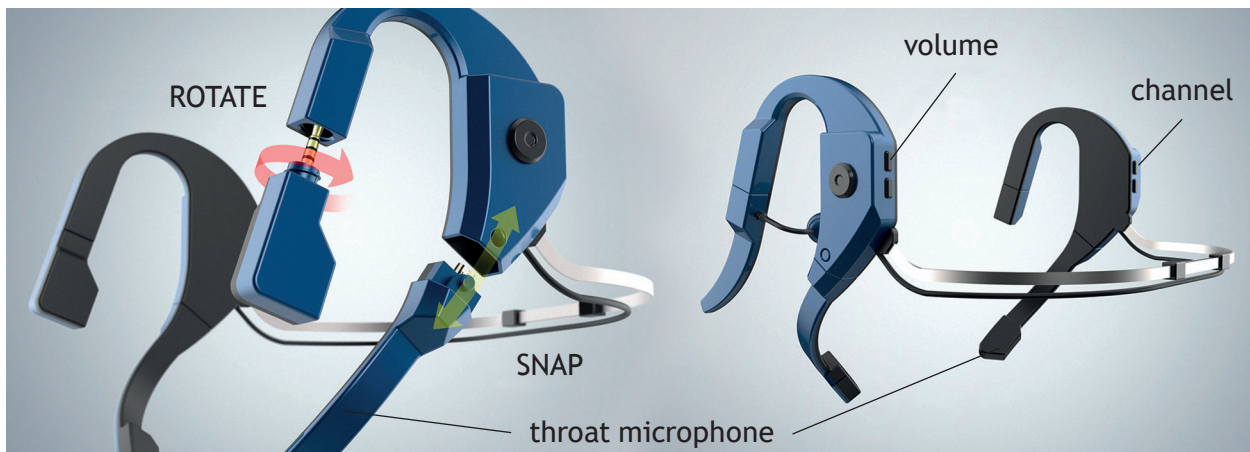
5

[Turn over

3. The Sea Voice headset was designed by Qvarta for people who access water for a range of recreational and sport activities. The headset uses bone conducting technology and throat microphones to transmit and receive speech.



headset with throat microphone



A range of research techniques would have been used to gain information when designing the Sea Voice headset.

- (a) Describe how information gained from the following may have influenced the design of the Sea Voice headset

- expert appraisals
- user trip.

4

The assembly of products such as the Sea Voice headset is influenced by a range of issues.

- (b) Describe the issues that influenced the choice of assembly methods for a product(s) with which you are familiar.

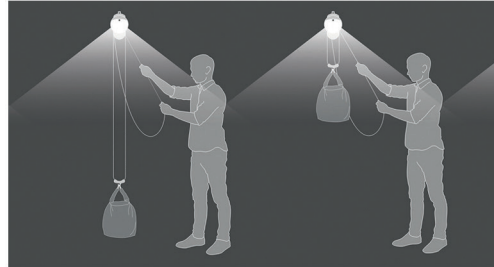
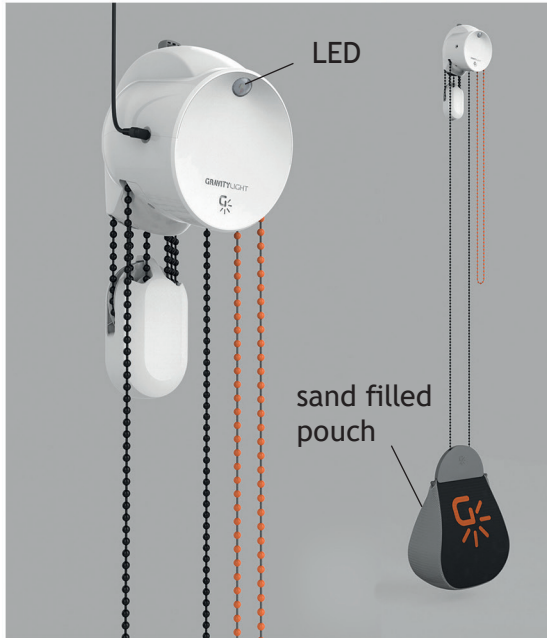
4

The Sea Voice headset is designed for a niche market.

- (c) Describe a suitable marketing strategy for the Sea Voice headset.

4

4. The GravityLight, designed by Martin Riddiford and Jim Reeves, provides an alternative to the paraffin fuelled lamps used in the developing world. The GravityLight is powered by the pouch filled with sand which slowly lowers to the ground, powering the LED.



Designers will consider a range of issues when designing products.

- (a) Describe how the target market and location of use may have influenced the design of the GravityLight.

6

Efficient production systems help ensure products such as the GravityLight are affordable.

- (b) Explain why 'Just In Time' production reduces the cost of products.

4

High quality manufacture is important to ensure the reliability of products such as the GravityLight.

- (c) Outline steps which could be taken to ensure products such as the GravityLight are manufactured to a high standard.

4

[Turn over for next question



5. Lilian van Daal's prototype chair was based on the structure of plants and manufactured using 3D printing.



- (a) Outline the reasons 3D printing was used to manufacture this prototype.

4

Lilian van Daal's chair was designed to provide a more sustainable solution to traditional furniture.

- (b) Describe how products are being designed to be more sustainable. You should refer to products with which you are familiar.

4

It is important for designers of innovative products, such as Lilian van Daal, to protect their Intellectual Property Rights (IPR).

- (c) Identify a suitable method which could be used to protect the IPR of the chair and outline its key features.

4

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**Section 2**

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|------------|---|
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| Question 3 | Images and reference to ‘The Sea Voice Headset’ are reproduced by kind permission of Sea Voice Inc.                                     |
| Question 4 | Images and reference to ‘GravityLight’ designed by Martin Riddiford and Jim Reeves are reproduced by kind permission of Deciwatt Ltd.   |
| Question 5 | Images and reference to ‘Biomimicry: 3D printed soft seat’ designed by Lilian Van Daal are reproduced by permission of Lilian Van Daal. |