

STUDENT NUMBER           Letter

# PRODUCT DESIGN AND TECHNOLOGY

## Written examination

Wednesday 6 November 2019

Reading time: 11.45 am to 12.00 noon (15 minutes)

Writing time: 12.00 noon to 1.30 pm (1 hour 30 minutes)

## QUESTION AND ANSWER BOOK

### Structure of book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	11	11	45
B	11	11	45
			Total 90

- Students are permitted to bring into the examination room: pens, lead and coloured pencils, water-based pens and markers, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or correction fluid/tape.
- No calculator is allowed in this examination.

#### Materials supplied

- Question and answer book of 17 pages
- Detachable insert for Section B in the centrefold

#### Instructions

- Detach the insert from the centre of this book during reading time.
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

#### At the end of the examination

- You may keep the detached insert.

**Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.**

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**SECTION A****Instructions for Section A**

Answer **all** questions in the spaces provided.

**Question 1** (3 marks)

The table below lists the first step of the investigating and defining stage of the product design process.

List the other three steps of this stage. The steps have to be in order.

<b>Investigating and defining stage of the product design process</b>	
1	<i>Identify end user(s), need, problem or opportunity</i>
2	
3	
4	

Use the following information to answer Questions 2–6.

Flashlight, Lantern, and Bike light 3 in 1  
Combines a long throw beam primary light  
with multi-coloured side light  
Sidelight includes red, green, blue and white LEDs

RS20 1050 LM




Patent number of Side light: ZL201420259678.7  
Patent number of Magnetic Rechargeable Function: ZL201220234503.4



3 in 1

RS20 1050 LM



#### Features of the multifunction torch

- combines one primary light-emitting diode (LED) with multi-coloured side LEDs to create a 3-in-1 flashlight, lantern and bike light
- can be used as a lantern or area light, freeing your hands
- side LEDs also have a red SOS function and a green flash mode – the red SOS signal is the international standard rescue signal and the green flashing mode can be used as a location beacon
- has a magnetic connection USB charging cable that can be removed quickly and safely at any time, which allows easy recharging
- ergonomic design for simple one-handed operation with switches that are easy to locate in the dark
- rechargeable lithium-ion battery can be recharged quickly from any available USB port
- waterproof to two metres under water

Source: adapted from Klarus, <[www.klaruslight.com](http://www.klaruslight.com)>

**Question 2** (2 marks)

Identify **one** typical end user of the multifunction torch and outline in what context the torch would typically be used.

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**Question 3** (3 marks)

Researchers use quantitative data to differentiate between similar torches on the market.

- a. Write **one** question that could help collect this quantitative data. 1 mark

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- b. How can quantitative data be used to ensure the success of the multifunction torch over similar products on the market? 2 marks

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**Question 4** (6 marks)

- a. State **one** product design factor and describe its importance to the primary function of the multifunction torch. 2 marks

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- b. Explain how the multifunction torch could be tested to ensure that it meets the expectations of the end user(s). 2 marks

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- c. Outline two aspects that should be considered if the manufacturer of the multifunction torch chooses the Design for Disassembly (DfD) sustainability framework. 2 marks

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_

**Question 5** (2 marks)

Identify and explain **one** new technology that could have been used in the creation of the multifunction torch during the design and development stage.

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**Question 6** (2 marks)

Select **one** feature of the multifunction torch and describe how anthropometric data could have been used in the design and development stage of the torch in relation to this feature.

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*Use the following information to answer Questions 7–9.*



Source: adapted from Nireeka, <[www.indiegogo.com/projects/nireeka-the-most-affordable-smart-ebike#](http://www.indiegogo.com/projects/nireeka-the-most-affordable-smart-ebike#)>

**Question 7** (2 marks)

Explain why it is a legal responsibility of product designers to acknowledge intellectual property.

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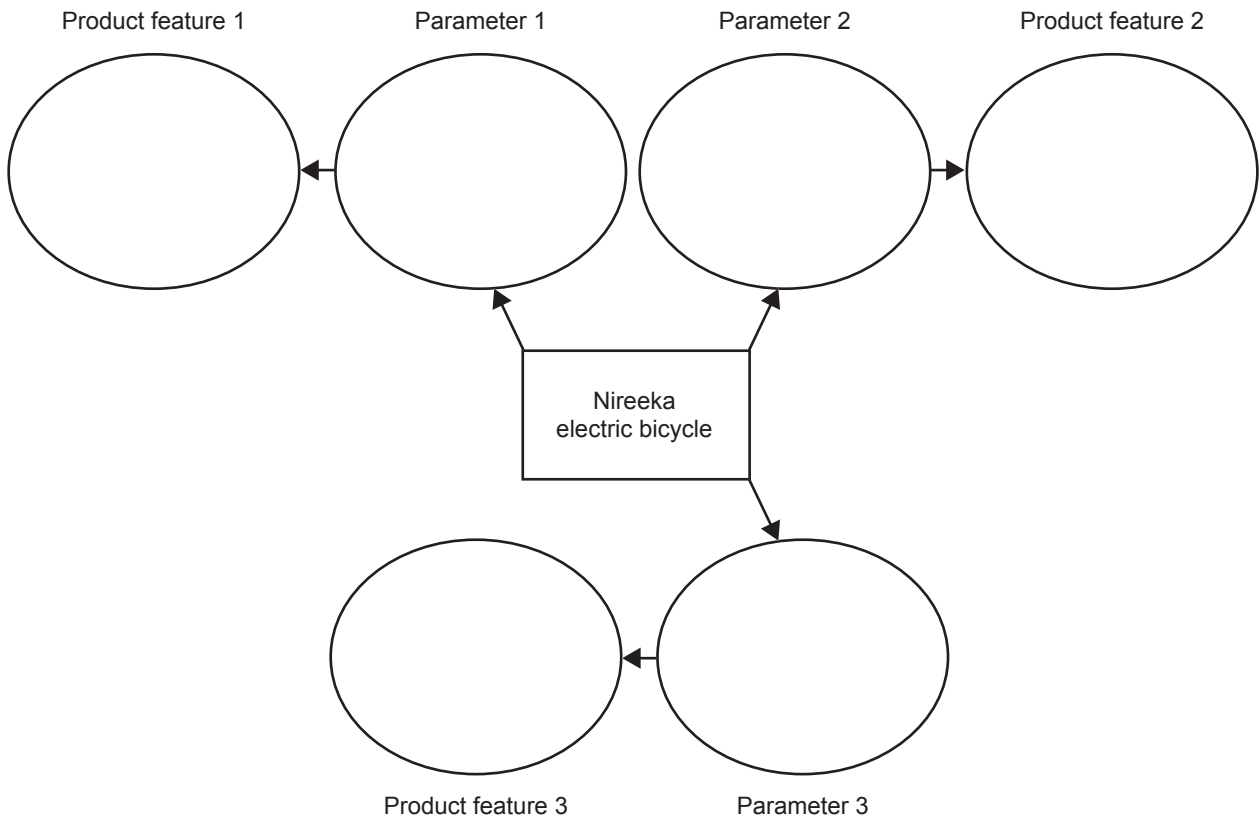
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**Question 8** (16 marks)

- a. Complete the concept map below with three product features of the Nireeka electric bicycle. Identify one parameter for each product feature. 6 marks



- b. List **one** critical thinking technique that the designers of the Nireeka electric bicycle may have used to refine the preferred design prior to production. 1 mark

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- c. Explain how a critical thinking technique may have been used during the product development process of the Nireeka electric bicycle. 3 marks

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- d. Other than intellectual property, identify two areas of legal responsibility that the designers would have had to consider when designing the Nireeka electric bicycle. Include a reason for each area of legal responsibility in your response. 4 marks

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

- e. Explain why conducting research to develop a typical end-user profile for the Nireeka electric bicycle could have been useful. 2 marks

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**Question 9 (3 marks)**

Describe **one** type of planned obsolescence that may influence the buyer of the Nireeka electric bicycle. Indicate how planned obsolescence may affect the designer and the manufacturer of the bicycle.

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**Question 10** (2 marks)

Explain why creativity and innovation are vital for the product development process to be successful.

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**Question 11** (4 marks)

a. What is the difference between a hazard and a risk?

2 marks

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b. Explain how a hazard may be identified and how steps could be taken to reduce or to eliminate the hazard from the production process.

2 marks

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**SECTION B**

**Instructions for Section B**

Please remove the insert from the centre of this book during reading time.  
 Use the material provided in the insert to answer the questions in this section.  
 Answer **all** questions in the spaces provided.

Tick (✓) one product from the list below and use this product to answer the questions that follow.

gift sales display counter	
tour guide uniform	
coordinated jewellery set	

**Question 1** (10 marks)

Write the specifications of the design brief for your product. The specifications should include:

- an outline of the context, including the end user(s)
- four relevant product design factors and their associated parameters.

**Design specifications**

Outline of context \_\_\_\_\_

End user(s) \_\_\_\_\_

Product design factors and associated parameters

	Product design factor	Associated parameter
1		
2		
3		
4		

**Question 2** (2 marks)

- a. Identify **one** requirement related to the design brief from Question 1 that demonstrates how your product would appeal to the end user(s) at the gallery or museum. 1 mark

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- b. Why is the requirement identified in **part a.** important to the end user(s)? 1 mark

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**Question 3** (2 marks)

Identify one constraint from the design scenario and write this constraint as an evaluation question.

Constraint \_\_\_\_\_

Evaluation question \_\_\_\_\_

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**Question 4** (2 marks)

State **one** parameter from the requirements related to the design brief from Question 1 and identify **one** area of research that could help you satisfy this parameter.

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**Question 5** (2 marks)

Identify the main material that you could use in your product.

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Briefly describe **two** characteristics and/or properties of this material that make it suitable for your product.

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**Question 6** (6 marks)

Draw and annotate two visualisations for your chosen design in the boxes provided below.

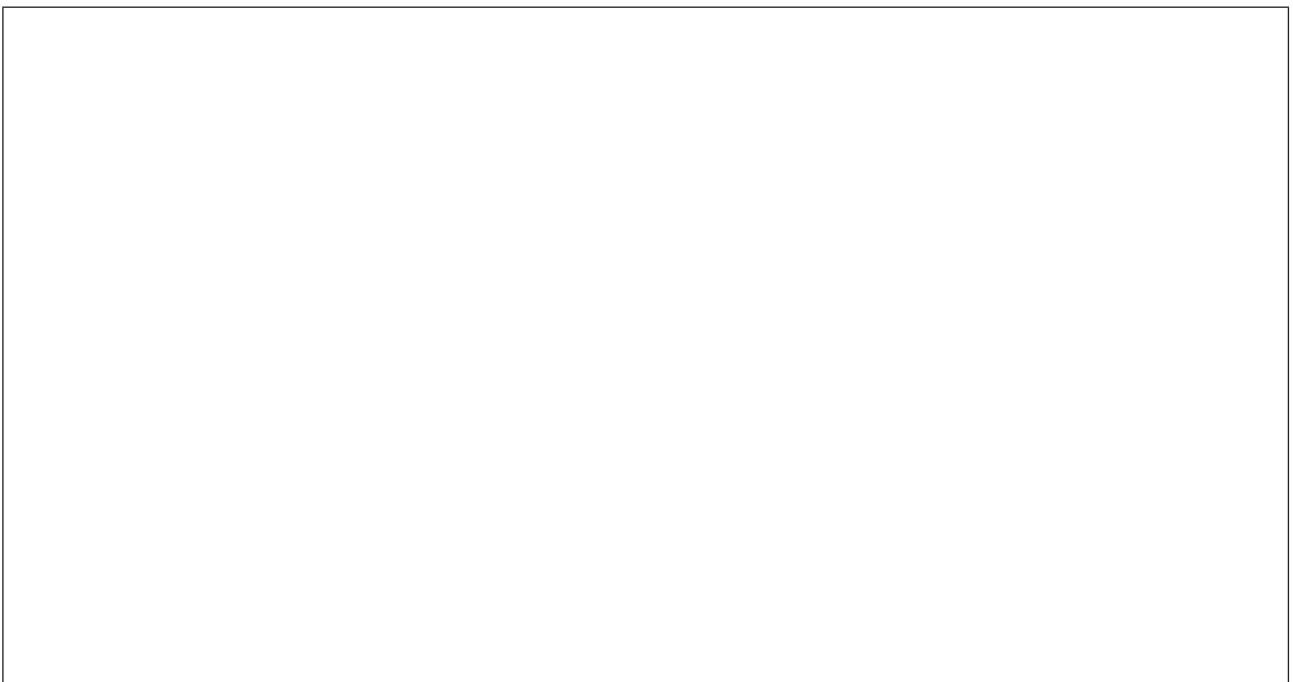
Your response to this question will be assessed against the following assessment criteria.

1	innovation and creativity	2 marks
2	clarity and detail	2 marks
3	suitability/function for intended use of the product	2 marks

## Visualisation 1



## Visualisation 2

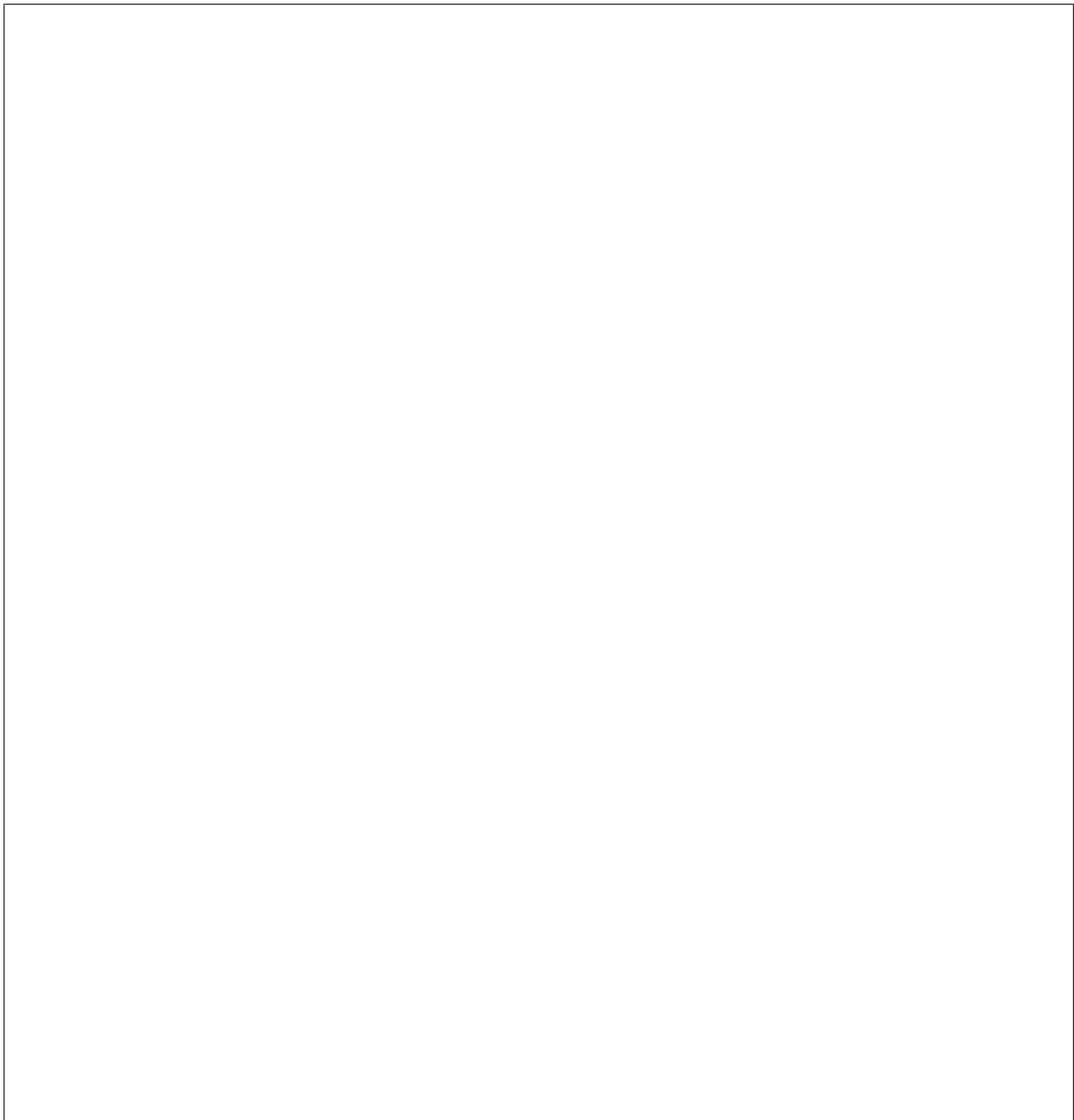


**Question 7** (10 marks)

Draw **one** annotated view of your design based on **one** visualisation from Question 6. This drawing should be a three-dimensional (3D) pictorial drawing to show what the whole product will look like.

Your response to this question will be assessed against the following assessment criteria.

1	function/suitability and use of visual, tactile and aesthetic parameters in the design option	4 marks
2	four annotations that indicate how the requirements of the design brief have been met	4 marks
3	clarity and detail of drawing	2 marks



**Question 8** (3 marks)

Safety is important when evaluating your product for the end user(s).

Explain how the function of your product will be improved by considering safety.

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**Question 9** (4 marks)

Manufacturing a product involves using a range of construction processes to join materials.

- a. Name one specific construction process that you will use to assemble your product in your chosen design option. Describe why this construction process is **suitable** for and benefits your chosen design option. In your response, include the equipment used.

2 marks

Construction process \_\_\_\_\_

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- b. Name **another** specific construction process that is **unsuitable** for your chosen design option and describe why you consider this construction process to be unsuitable.

2 marks

Construction process \_\_\_\_\_

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**Question 10** (2 marks)

Feedback from the end user(s), relating to the end product, has shown that some areas need improvement.

Identify **one** potential problem and explain how the designer could have addressed this problem during the product design process.

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**Question 11** (2 marks)

During the design process of a product, careful consideration must be given to instructions for the use, care and maintenance of the product by the end user.

Choose **one** of the label templates below and provide instructions for the use, care or maintenance of your product.

 **WARNING**

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OR

**INSTRUCTIONS**

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**Insert for Section B**

Please remove from the centre of this book during reading time.

## Design scenario

The State of Victoria has a network of state and community galleries and museums with strong collections that showcase the history of Victoria. Galleries and museums in Melbourne and regional Victoria regularly present fascinating exhibitions about Victoria's history.

Museum Victoria is currently considering funding a suitable gallery or museum to host and support an exhibition in 2020. This exhibition will showcase the rich and diverse history of a town, region or city in Victoria.

Your local council is preparing a submission for your region to host the exhibition. The submission will include the theme of the collection and suggestions as to how the gallery or museum will enhance visitors' experience of the exhibition.

You have been invited to submit two visualisations and one design option for a product that complements the exhibition's theme and space. The designs for the submission must:

- showcase a collection that has relevance to your region
- relate to an individual, group, landmark or event (excluding sporting events)
- be unique, creative and innovative
- incorporate **two or more** materials.

Select **one** product from the list below.

**Product 1**

<b>Gift sales display counter</b>
• 360-degree rotating section suitable for souvenirs such as magnets, lanyards or postcards
• lockable area to view expensive souvenirs, such as jewellery
• tiered display area for catalogues and books

**Product 2**

<b>Tour guide uniform</b>
• must include three pieces: shirt, pants/skirt/dress, jacket/vest
• must make wearer easily identifiable as an employee of the gallery or museum
• must be lightweight and comfortable to wear

**Product 3**

<b>Coordinated jewellery set</b>
• three pieces of jewellery selected from: earrings, bracelet, ring, necklace, brooch, pin
• suitable for a variety of ages and genders
• appropriate to sell at the gift sales display counter for this specific exhibition