VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education 2023

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER | | | | | | | | | Letter |

PRODUCT DESIGN AND TECHNOLOGY

Written examination

Tuesday 31 October 2023

Reading time: 9.00 am to 9.15 am (15 minutes)
Writing time: 9.15 am to 10.45 am (1 hour 30 minutes)

QUESTION AND ANSWER BOOK

Structure of book

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A	9	9	45
B	9	9	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 16 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.

SECTION A

Instructions for Section A

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

Use the following information to answer Questions 1–5.

Microsoft Adaptive Mouse

Due to copyright restrictions,
this material is not supplied.

Figure 1: Microsoft Adaptive Mouse options and accessories

Due to copyright restrictions,
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Figure 2: Microsoft Adaptive Mouse directional button using elbow

Due to copyright restrictions,
this material is not supplied.

Figure 3: Microsoft Adaptive Mouse directional button using hand

- The Microsoft Adaptive Mouse allows the user to interact with a mouse in non-traditional ways, such as using a hand or an elbow to control the movement of the mouse pointer.
- The Microsoft Adaptive Mouse has a range of options and accessories that are designed to suit a variety of physical needs.
- The Microsoft Adaptive Mouse options include a square-shaped lightweight mouse with two buttons and varied mouse shapes (shown in Figure 1).
- The Microsoft Adaptive Mouse accessories include a joystick, dual button and directional button.
- The directional button can be used in multiple ways to suit the needs of the user (shown in Figures 2 and 3).
- The accessories are sold separately, allowing for full customisation.

Source: <support.microsoft.com>

Question 1 (4 marks)

A design brief is developed to clarify the project task and to define the personal, local or global design problem to be solved.

Identify **four** constraints and/or considerations that may have been evident in the design brief for the Microsoft Adaptive Mouse.

Question 2 (4 marks)

There are many end users who could benefit from the Microsoft Adaptive Mouse.

Describe the profile of two potential end users for this product; describe how the Microsoft Adaptive Mouse would meet the needs of each end user in your response.

End user 1

End user 2

Question 3 (8 marks)

The Microsoft Adaptive Mouse is further customisable by adding 3D-printed alternative shapes and sizes for the mouse cover.

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Source: Microsoft, website link to <shapeways.com>

a. Discuss **one** advantage and **one** disadvantage of rapid 3D prototyping to make customisable mouse covers. 4 marks

Advantage _____

_____

_____

Disadvantage _____

_____

_____

b. Explain how the customisable mouse covers may improve the product's sustainability. 4 marks

_____

_____

_____

_____

_____

_____

Question 4 (3 marks)

Identify the type of obsolescence that most likely relates to the Microsoft Adaptive Mouse and analyse **one** benefit of this type of obsolescence.

Question 5 (6 marks)

The Microsoft Adaptive Mouse is an improvement on an existing product. Images of an existing mouse product are shown below.

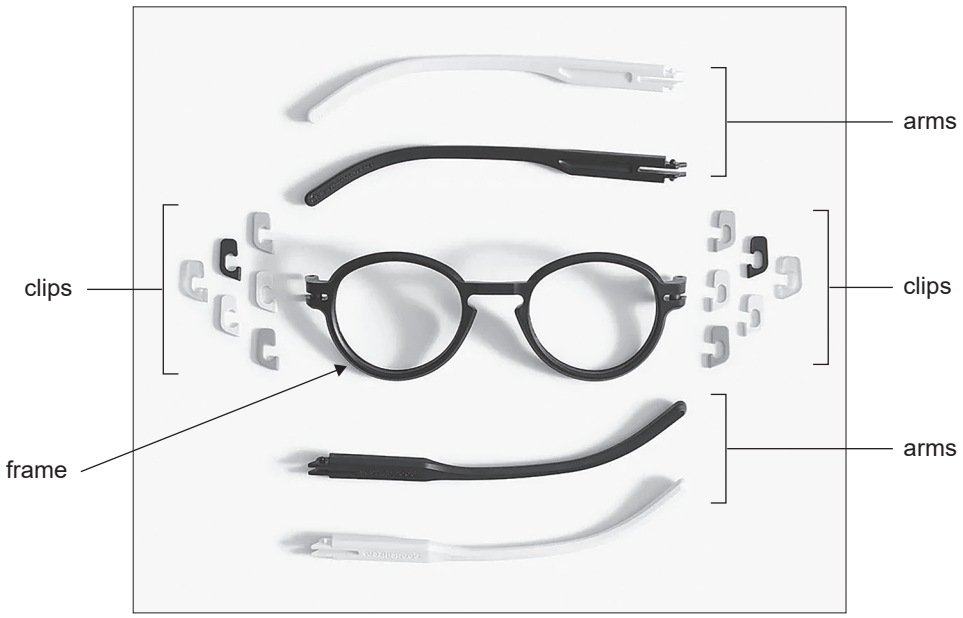
Due to copyright restrictions, this material is not supplied.

Due to copyright restrictions, this material is not supplied.

Source: (left) JEFeatherston/Shutterstock.com; (right) Pressmaster/Shutterstock.com

Evaluate how the Microsoft Adaptive Mouse has shown improvement through innovation and modification of the existing mouse shown above.

Use the following information to answer Questions 6 and 7.



Good Citizens is a Sydney-based company. Their core products are sunglasses made from single-use plastic bottles.

Good Citizens went through an extensive research and development phase to produce their sunglasses. The design process took 752 days and more than 2500 failed attempts to invent a way to turn the plastic from single-use bottles into 100% recycled sunglasses frames. Each pair takes 7.75 single-use bottles to produce, and producing each pair prevents 10 kg of CO_2 from reaching the atmosphere.

The sunglasses are 100% recycled, modular (with replaceable parts) and made in Sydney. When parts are replaced, the company takes back the broken parts for recycling.

Source: adapted from <www.goodcitizens.com.au>; reproduced with permission.
Good Citizens also advise the following correction: one plastic bottle produces one frame.
Each sunglasses case and cleaning cloth is made from 2.5 bottles, plus Good Citizens funds the removal of 25 bottles from rivers and waterways and prevents 10 kg of CO_2 from reaching the atmosphere with each pair sold.

Question 6 (6 marks)

The designers of Good Citizens sunglasses went through a process of testing and evaluation.

a. Explain **one** reason why tests are important during the research and development (R&D) of a new product, such as the Good Citizens sunglasses. 2 marks

b. Describe **one** characteristic that makes the recycled plastic appropriate for the sunglasses. 2 marks

c. Describe **one** property that makes the recycled plastic appropriate for the sunglasses. 2 marks

Question 7 (4 marks)

Good Citizens sunglasses have three types of parts: frames, arms and clips.

Analyse how Design for Disassembly (DfD) may promote sustainable consumer practices for the user of the Good Citizens sunglasses.

Use the following information to answer Questions 8 and 9.

Dresden glasses are made in Australia to high quality and with guaranteed ethical production standards. Dresden glasses cost $100, and come with a 10-year warranty and full replacement option.

Dresden produces glasses with simple modular parts that fit the end user. The three components – frames, arms and pins – fit all face shapes. The frames and arms of the glasses each come in three sizes: small, medium and large. They are mix-and-match, so a user can have different-sized frames and arms, allowing for many size combinations.

Source: <dresden.vision/au>; reproduced by permission

Question 8 (6 marks)

Glasses that fit the end user are important to Dresden.

Discuss **two** user-centred parameters that relate to the sizing options of the Dresden glasses.

Question 9 (4 marks)

Dresden makes its products in Australia in a lean manufacturing setting.

Analyse why a lean manufacturing approach is suitable for the Dresden glasses.

END OF SECTION A
TURN OVER

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.

Three-dimensional multipurpose decorative headpiece	
Three-dimensional multipurpose screen	

Question 1 (2 marks)
Describe a checking method that could be used to evaluate the success of the product, for **each** of the evaluation questions below.

Evaluation question	Checking method to evaluate the success of the product
Does the prop include elements suitable for the production theme?	
Was the prop suitable for any actor to use?	

Question 2 (4 marks)

a. Describe **one** creative-thinking technique you would use to develop design ideas for your chosen product. 2 marks

b. Describe **one** critical-thinking technique you would use to develop design ideas for your chosen product. 2 marks

Question 3 (14 marks)

Draw **one** design option for your product design in the box below. This drawing should provide enough detail to clearly show what the whole product will look like.

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

1	application of visual, tactile and aesthetic parameters (**any** combination of colour, line, shape, form, texture and tone)	6 marks
2	**two** annotations indicating the major features of the product and their connection to the design brief	2 marks
3	innovation and creativity	4 marks
4	function and suitability of the product for its intended use	2 marks

Question 4 (5 marks)

Referencing your design option from **Question 3**, in the box below draw an exploded view (close-up drawing) of **one** detail of the product to communicate or highlight a requirement of the design brief.

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

1	clarity and detail of the exploded view	3 marks
2	annotations indicating the processes used and the materials/trims/notions	2 marks

DO NOT WRITE IN THIS AREA

Question 5 (8 marks)

a. Describe **two** risks that could be involved in the production of your chosen product. In your response, refer to tools, equipment and machinery. 4 marks

b. Outline the risk-management measures for **one** of the risks you identified in **part a.** 4 marks

Question 6 (3 marks)

An international theatre company is interested in purchasing your designed product for their multiple theatres worldwide. This will require the manufacturing to be scaled up from one-off to low-volume.

Identify **one** modification you could make to the design to accommodate this scale of manufacturing and explain why the change would be necessary.

Question 7 (3 marks)

Computer-aided design (CAD) would most likely be used in the design of your product.

Discuss the benefits of using CAD to design your product.

Question 8 (3 marks)

The product will need to be kept in storage for long periods of time.

Provide instructions for the suitable storage of your product, taking into consideration its materials.

Question 9 (3 marks)

End-user feedback about the 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.

END OF QUESTION AND ANSWER BOOK

Insert for Section B

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

Design scenario

A local theatre company is looking for designers to submit ideas for props[1] to be used in an upcoming production, which will incorporate themes based on science fiction[2] or fantasy[3]. Due to limited storage space in the theatre, minimal props will be used. Props will become very important, as they may be needed for more than one purpose.

The design brief must focus on props that actors will use on stage. The props must be creative and innovative, to contribute to the overall success of the production.

[1]**prop** – an object used on stage by actors during a performance or production. A prop will help the actor to give 'life' to their character. Actors may be children or adults of any gender.

[2]**science fiction (sci-fi)** – a genre that creatively depicts real or imaginary science and technology as part of a setting or theme

[3]**fantasy** – a genre that uses imaginative and often supernatural or magical elements within a fictional world

The products must:

- include elements suitable for the production theme
- be innovative and creative
- incorporate at least two materials
- be suitable for any individual actor to use.

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

Product 1

Three-dimensional multipurpose decorative headpiece
• Must include a design feature or features that allow the headpiece to be transformed into another prop by the actor on stage.
• Must include a design feature that creates movement, sound or light.
• Must be vertical and sit safely on the actor's head.

Product 2

Three-dimensional multipurpose screen
• Must be portable and freestanding.
• Must include a design feature or features that allow the screen to be transformed into another three-dimensional prop by the actor on stage.
• The transformed three-dimensional prop must safely hold the weight of an actor.

END OF INSERT