

STUDENT NUMBER Letter

PRODUCT DESIGN AND TECHNOLOGY

Written examination

Friday 20 November 2020

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

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
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.

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SECTION A**Instructions for Section A**

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

Question 1 (3 marks)

Identify one step from each of the stages of the product design process given in the table below.

Stage	Step
investigating and defining	
design and development (conceptualisation)	
planning and production	

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Use the following information to answer Questions 2 and 3.

Spill-proof baby- and toddler-friendly rotary Gyro Buddy Bowl



The spill-proof rotary Gyro Buddy Bowl is the perfect bowl for babies and toddlers, designed to stay upright, saving you time cleaning up the typical mess.

The frustration-free bowl features two hinges, allowing for full 360-degree motion. Its ability to stay upright is not magic – gravity keeps the bowl at the same orientation.

Features

- built-in removable bowl
- rotates 360 degrees
- easy-grip handles
- converts into a flying saucer toy
- dishwasher proof in top rack
- made from tough plastic

Specifications

- material: non-toxic plastic
- colour: green, orange
- capacity: approximately 200 g
- diameter: 17 cm (external), 9 cm (internal)
- height: 7 cm

Source: adapted from ‘Spill-Proof Baby & Toddler Friendly Rotary Gyro Buddy Bowl’, <www.gadgets4geeks.com.au>

Question 2 (11 marks)

a. Because of its unique nature, the Gyro Buddy Bowl may have a range of end users.

Name **one** typical end user of the Gyro Buddy Bowl.

1 mark

b. Explain why material selection is important for the primary function of the Gyro Buddy Bowl. 2 marks

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- c. Outline **one** context in which the Gyro Buddy Bowl could be used. 1 mark

- d. State **one** product design factor and describe its importance to the secondary function of the Gyro Buddy Bowl. 2 marks

- e. The designers of the Gyro Buddy Bowl are responsible for assessing the risks associated with the bowl's manufacture and use.

Identify **one** stage of the product design process at which risk should be assessed and describe **one** possible risk at this stage. 3 marks

- f. Outline **one** approach to managing the possible risk identified in **part e**. 2 marks

Question 3 (9 marks)

- a. Choose two features of the Gyro Buddy Bowl listed in the information on page 4. Explain how the end user from **part a.** of Question 2 may find each of these features appealing. 2 marks

Feature 1 _____

Feature 2 _____

- b. Many spill-proof children’s bowls have features similar to those of the Gyro Buddy Bowl. This allows comparison between bowls to determine each bowl’s performance. Describe how qualitative research could be conducted to gather information about the Gyro Buddy Bowl. 2 marks

- c.
 - i. Describe **one** method of market research that could be used to gather quantitative data in relation to the product design factors of the Gyro Buddy Bowl. 2 marks

- ii. Explain why this quantitative data is needed and what it could be used for. 3 marks


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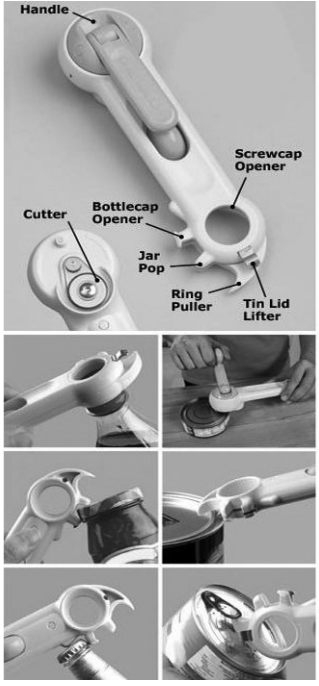
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Use the following information to answer Questions 4–9.

Multifunction Kitchen Tool



8 IN 1



Open every type of jar, bottle and can imaginable with this 8-in-1 kitchen tool.

It does it all ... with multiple functions built into one streamlined, lightweight tool. This is the *one* tool you need to open virtually anything in your kitchen! It features six different built-in cutting, gripping and twisting tools to let you easily open cans, bottles and jars of all sizes and shapes. It can also be used to lift tabs, pry tins, break seals, twist caps and pop tops in a flash.

The ergonomic can opener has a smooth-turning handle that will not put pressure on arthritic fingers. It folds the metal as it cuts so it will not leave sharp edges, and it holds on to the lid for easy disposal. The opposite end has tools to pry recessed lids from tin cans, break vacuum seals of stubborn jar lids, remove twist caps, lift tabs and flip bottle caps.

Highlights

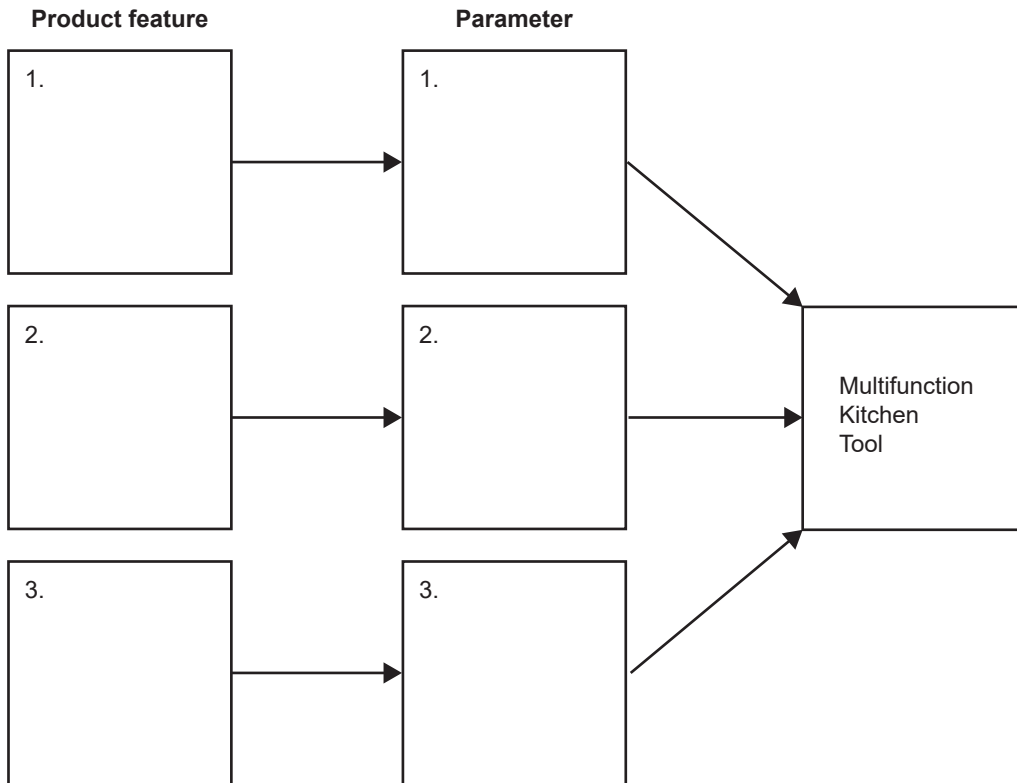
- eight functions: opens cans, twists caps, opens bottles, breaks jar seals, opens tin lids, lifts tabs, crushes garlic and sharpens knives
- no sharp blades, so it is safe for children to open bottles
- leaves no sharp edges
- safe, comfortable and easy to use

Source: adapted from '8 In 1 Kitchen Tool Can Jar Bottle Tin Opener', <www.dshop.com.au>

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Question 4 (6 marks)

Complete the concept map below with three product features of the Multifunction Kitchen Tool. Identify one parameter for each product feature.



Question 5 (4 marks)

a. Describe **one** way in which potential end users of the Multifunction Kitchen Tool could be identified.

1 mark

b. The product designers realised that the range of potential end users of the Multifunction Kitchen Tool was greater than expected. As a result, they decided to gather anthropometric data in relation to hand size to assist in the development of the product features of the Multifunction Kitchen Tool.

Outline how this specific anthropometric data could be used to develop the various product features of the Multifunction Kitchen Tool and explain why the use of this data is important.

3 marks

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Question 6 (2 marks)

List two expectations that end users of the Multifunction Kitchen Tool may have.

1. _____

2. _____

Question 7 (4 marks)

The Multifunction Kitchen Tool is a complex product. Prior to agreeing on the final design, the product designers experimented with and trialled various combinations of kitchen tools and made a range of prototypes. Because of the high level of sophistication needed to produce the kitchen tool, various new technologies were employed in the design and development (conceptualisation) stage.

Name two new or emerging technologies and explain how each technology could have been used to develop a **different** product feature of the Multifunction Kitchen Tool.

Technology 1 _____

Explanation _____

Technology 2 _____

Explanation _____

Question 8 (3 marks)

The Multifunction Kitchen Tool could be marketed as a sustainable product. One argument is that it replaces a range of kitchen tools, therefore reducing the carbon footprint during manufacture of separate items.

Identify a strategy other than marketing that could influence the design, production and distribution of the Multifunction Kitchen Tool to make it more sustainable. Describe the influence of this strategy on the sustainability of the tool.

Question 9 (3 marks)

Mass production seems an obvious choice when deciding on a production scale for the Multifunction Kitchen Tool.

Outline three benefits of mass production to the viability of the Multifunction Kitchen Tool in the marketplace.

1. _____

2. _____

3. _____

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.

tactile play mat	
flip-top activity table	
outdoor play tools	

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		

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Question 2 (1 mark)

Outline which feature of your product would be most appealing to the end user(s).

Question 3 (2 marks)

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

Constraint _____

Evaluation question _____

Question 4 (4 marks)

Discuss **one** area of research that could help satisfy the constraint identified in Question 3. Justify your answer by explaining its relevance to the design scenario.

Question 5 (2 marks)

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

List two characteristics and/or properties of this material that make it suitable for the specific requirements of your product.

1. _____

2. _____

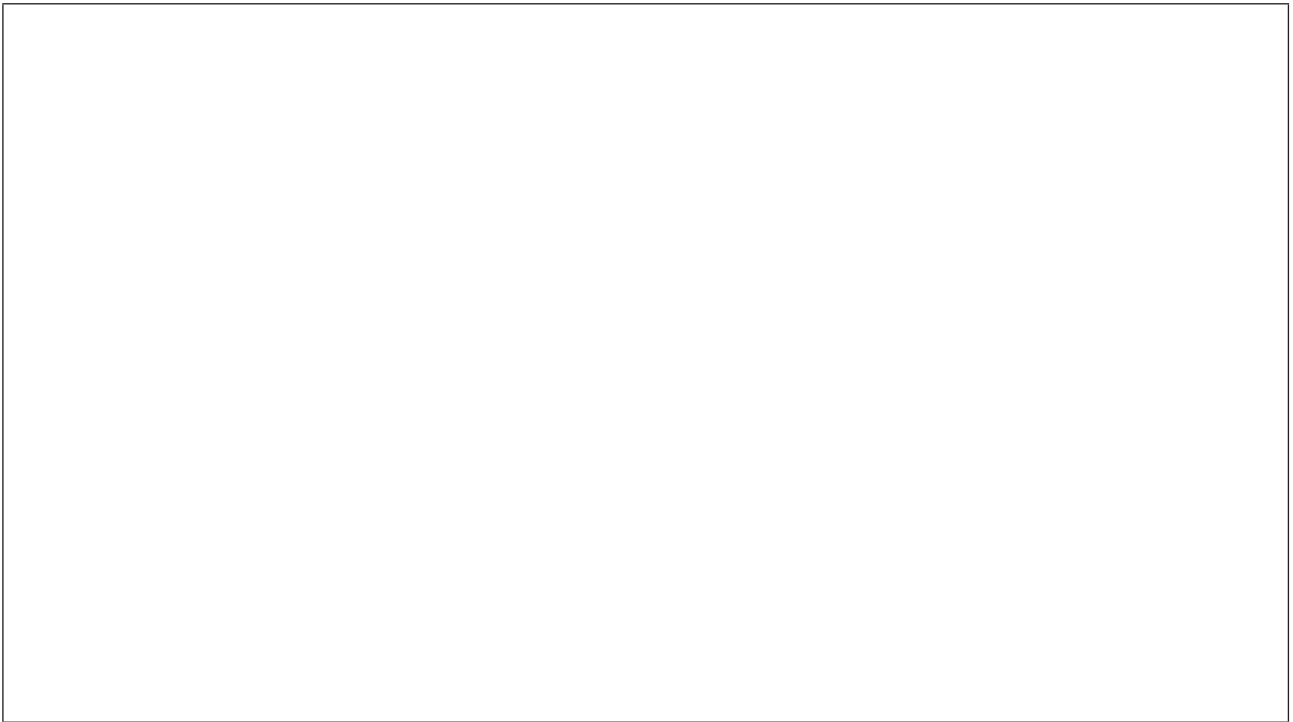
Question 6 (4 marks)

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

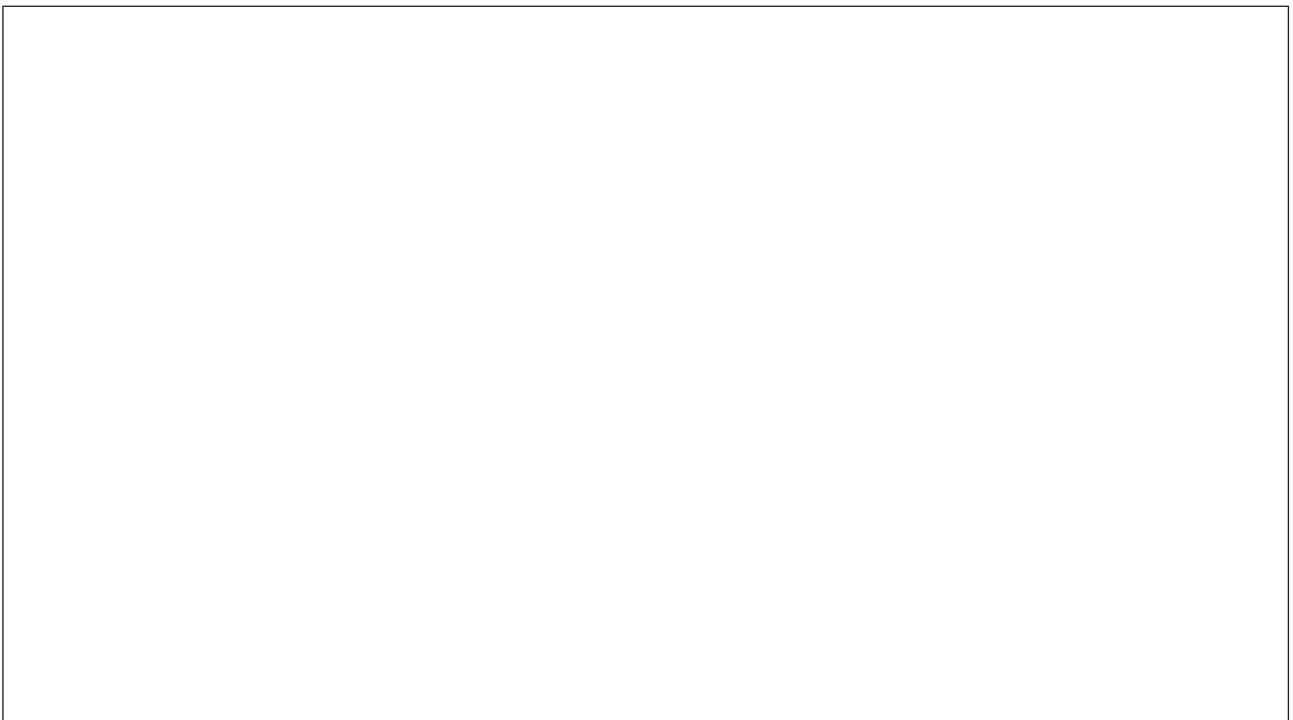
Your response to this question will be assessed against the following assessment criteria.

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

Visualisation 1



Visualisation 2

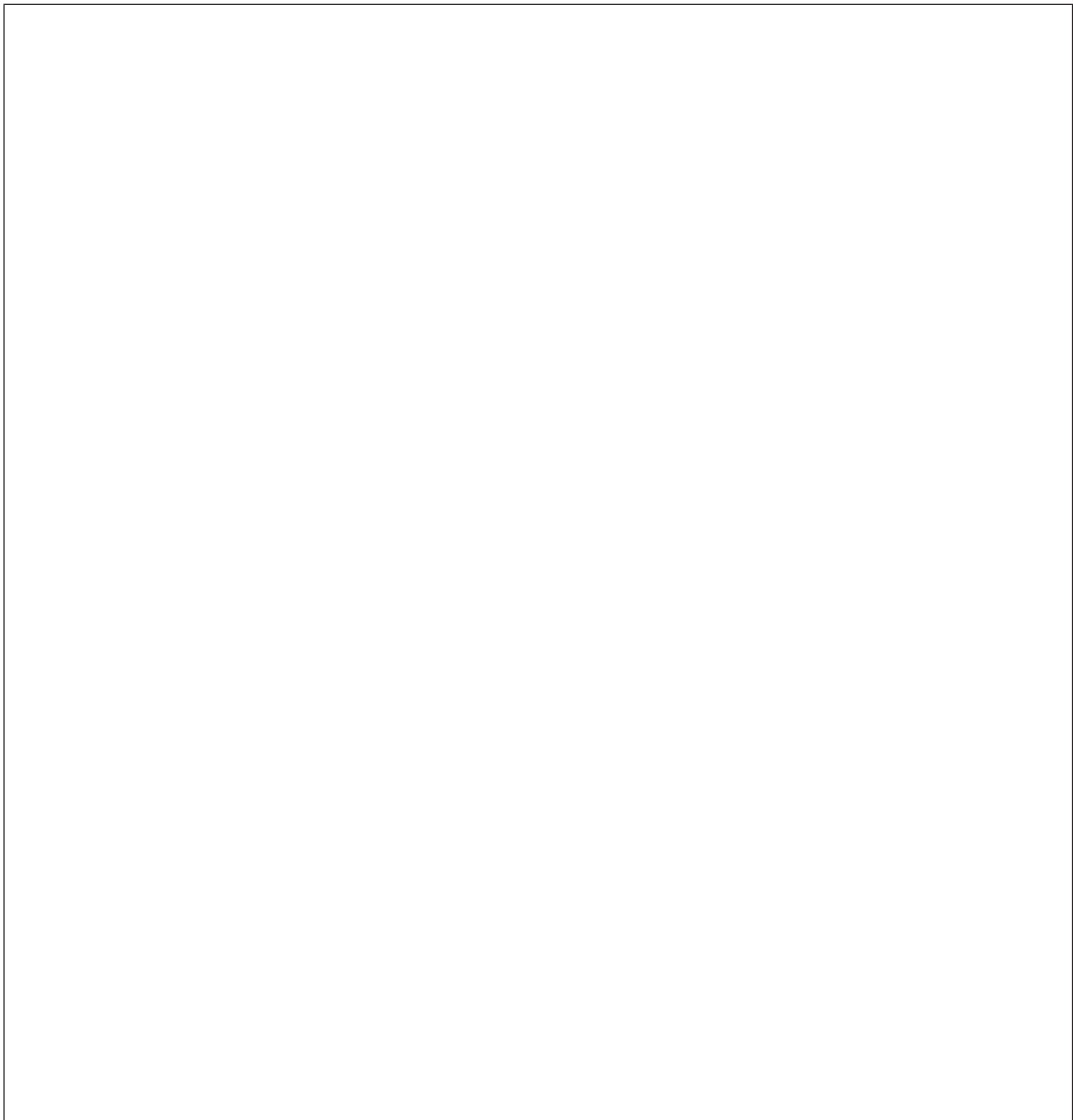


Question 7 (12 marks)

Draw **one** annotated view of your design based on **one** visualisation from Question 6. 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	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	innovation and creativity	2 marks
4	clarity and detail of drawing	2 marks



Question 8 (6 marks)

When sourcing, processing and assembling materials for your product you will need to consider Australian and international safety standards.

- a. Identify **one** possible safety issue associated with your product and discuss how you could address this safety issue in the design of your product. 3 marks

- b. Your product will be maintained and used by a range of people who run, use and visit the mobile toy library.

Write three instructions that will assist in the safe use, maintenance and/or care of your product. 3 marks

- 1. _____
- 2. _____
- 3. _____

Question 9 (4 marks)

Your product will be packed, transported around Victoria and used by many different end users.

Identify and describe one construction process that may be used to assemble your product and that will ensure it meets the requirements for packaging and transportation. In your description, include how specific equipment has to be used in the construction process.

Construction process _____

Description _____

Insert for Section B

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

Design scenario

Research in education has consistently shown that children of all ages learn naturally through the simple activity of play. Playing creates opportunities for children to explore their ideas, express their feelings and make sense of the world around them. When children play, they develop positive feelings about learning, which in turn motivates them to play – and learn – more. This play-based learning is ideal for children under five years old as it is at this age that their brains are forming pathways and connections. Through play, children’s brains are developing the important soft skills of creativity, communication, problem-solving, resilience, emotional regulation and relationship building.

Funding has been approved for the design of toys for a mobile toy library as part of a regional project to increase educational opportunities for young children in remote areas of Victoria who do not have access to toys. The planning committee has invited submissions for designs of toys that could be included in the mobile toy library. You will need to submit two visualisations and one annotated design option.

The toys must:

- be suitable and safe for children aged 2–5 years
- incorporate **two or more** materials
- fit into a small trailer (1800 mm in length, 1200 mm in width, 1200 mm in height) for storage and transport
- be creative, colourful and innovative.

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

Product 1

Tactile play mat
<ul style="list-style-type: none"> • has a variety of elements that focus on the sense of touch to stimulate fine motor skills
<ul style="list-style-type: none"> • has detachable 3D components
<ul style="list-style-type: none"> • can be transformed into a carry bag or a backpack

Product 2

Flip-top activity table
<ul style="list-style-type: none"> • has a reversible tabletop providing two different activities that stimulate fine motor skills
<ul style="list-style-type: none"> • has storage space for components related to the activities
<ul style="list-style-type: none"> • can be folded flat

Product 3

Outdoor play tools
<ul style="list-style-type: none"> • are suitable for play in sand, water or a garden
<ul style="list-style-type: none"> • consist of a set of three coordinated components that stimulate fine motor skills
<ul style="list-style-type: none"> • can be stored as one unit but not in a box