

A Level in Design and Technology: Product Design

H406/02 Problem Solving in Product Design

Practice Paper – Set 1

Time allowed: 1 hour 45 minutes

You must have:

· Resource Booklet

You may use:

- · a scientific calculator
- a ruler
- · geometrical instruments

First name	
Last name	
Centre number	Candidate number

INSTRUCTIONS

- Use black ink.
- Complete the boxes above with your name, centre number and candidate number.
- · Answer all the questions.
- The recommended reading time for the Resource Booklet is 35 minutes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary, but you must clearly show your candidate number, centre number and question number(s).
- Where appropriate, your answers should be supported by workings. Marks may be given for the correct method even if the answer is incorrect.
- Do **not** write in the barcodes.

INFORMATION

- The total mark for this paper is **70**.
- The marks for each question are shown in brackets [].
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- · This document consists of 12 pages.

Answer all the questions.

Before responding to the questions you must spend time reading and familiarising yourself with the Resource Booklet.

1* A council intends to run a scheme to provide residents with products so they are able to help themselves when there is bad weather in winter. Although the Council runs a fleet of gritting machines and snow ploughs, these are normally used for main roads. The clearing of smaller roads and driveways is normally the responsibility of the residents.

Councillors are impressed by a scheme that was run by Durham City Council in 2012 when residents were provided with free shovels and salt. The Scheme was called project 'Snow-Go'.

Critically examine the challenges that would be faced in providing a scheme of this nature. You will need to consider the different needs and requirements of wider stakeholders and users involved. Refer to information on page 2 of the Resource Booklet. [12]

2 A manufacturer has recommended two products to the Council for project 'Snow-Go' as detailed on **page 3** of the Resource Booklet.

The **Snow Shovel** would be suitable if the Council intended to give snow shovels away to residents.

The **Wheeled Snow Shovel** would be more suitable if the Council was going to consider loaning a superior product to residents.

Compare and contrast the properties of both products with reference to their functional suitability for undertaking the task of clearing snow.

In your response you must consider the following aspects of each product:

 materials; construction; maintenance. 	2]

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3 The Council will use an independent delivery company called 'Move-It' to deliver the shovels to residents. In order to consider the viability of project 'Snow-Go', the Council Finance Department requires the cost of the delivery operation.

A survey undertaken by the Council indicates that on average only 20% of the residents would qualify to loan the more expensive wheeled snow shovel.

Calculate the total cost of delivery to 1000 homes.

In your calculations you should use the data provided on pages 3 and 4 of the Resource Booklet.

Key requirements:

- avoid mixing types of shovel in the same carton;
- fill each carton as economically as possible;
- aim to include as close as possible to, and no less than, 20% wheeled snow shovels;
- avoid stacking cartons to allow delivery operatives ease of access to the top of the cartons.

Total cost £
[6]

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project.

The Council has given a brief to a designer to resolve issues with elderly residents who are having problems using the Snow Shovel and Wheeled Snow Shovel supplied by the Council's 'Snow-Go'

Critically eval	uate the suita	ability of the \	Wheeled Sr	now Shovel	product for	use by elde	erly users.
Refer to the in snow by elde	nformation or rly users.	n pages 5 an	d 7 of the F	Resource Bo	oklet that re	late to the s	shovelling o
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5 A concept product has been prototyped by the designer for elderly residents living in rural areas as outlined on **page 6** of the Resource Booklet.

Use sketches and/or notes to determine suitable methods of manufacture and assembly for the features of the concept design.

In your response you must include details of:

- · materials;
- · manufacturing processes;
- finishes;

[12]

The designer is now exploring the possibility of a multi-purpose product that not only resolves 6 issues with shovelling snow and spreading salt for elderly users, but also with their wider gardening requirements throughout the year.

A prototype called 'Ergo Kit' has been designed to enable elderly users and users with back injuries to undertake these activities with greater levels of comfort.

The Council would like to order an initial batch of 50 'Ergo Kits'. Each kit comprises a front handle assembly and a rear handle assembly.

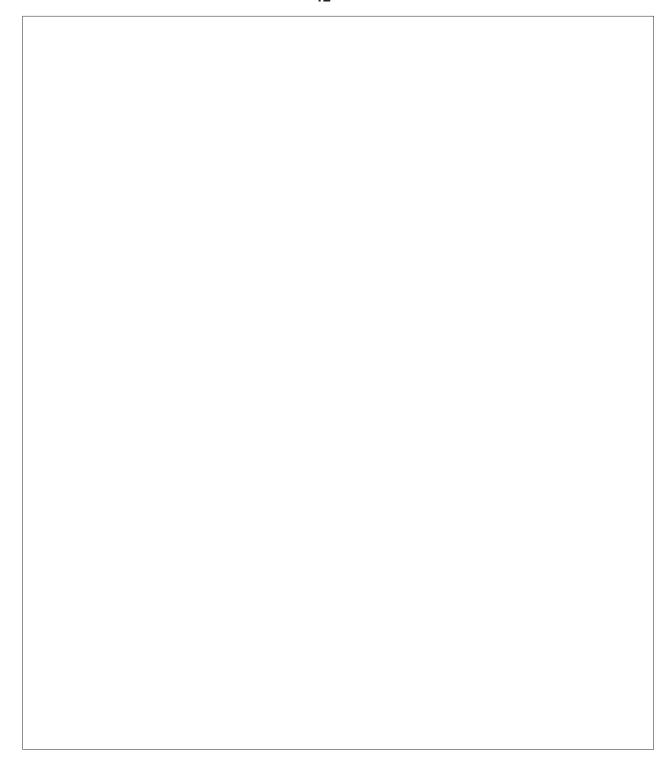
Use sketches and/or notes to show how the 'Ergo Kits' could be manufactured. Refer to the information provided on page 8 of the Resource Booklet.

In your response you must include:

- suggested materials;
- technical details of methods of manufacture;
- how the suggested materials and methods of manufacture consider the ergonomic requirements of elderly users. [12]

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END OF QUESTION PAPER



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