



Oxford Cambridge and RSA

Friday 16 June 2023 – Morning

A Level in Design and Technology: Product Design

H406/02 Problem Solving in Product Design

Time allowed: 1 hour 45 minutes



You must have:

- the Resource Booklet

You can use:

- a ruler (cm/mm)
- a scientific calculator
- geometrical instruments



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- Each question tells you which part of the Resource Booklet to refer to.

INFORMATION

- The total mark for this paper is **70**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **16** pages.

ADVICE

- Read each question carefully before you start your answer.

- 2 To ensure the combination of the ergonomic chair and standing desk shown in **Fig. 4** is suitable for OCR Accountants, a designer has been tasked with checking the product specifications against anthropometric data.

Use the anthropometric data in **Fig. 3A** and **Fig. 3B** to help you answer the following questions.

- (i) Complete the table to indicate the **total height range** for **90%** of the population: [1]

	Total height range (mm)
Sitting height	
Sitting eye height	
Sitting shoulder height	

- (ii) Calculate the **mean thigh thickness** of the population if there are equal numbers of men and women. Give your answer in mm and show your working. [2]

Mean thigh thickness mm

- (iii) Calculate the **maximum distance** the desk **must** rise to maintain a comfortable elbow height position for 90% of the user population. Give your answer in mm and show your working. [3]

Maximum distance mm

4 OCR Accountants requires an initial quantity of 100 standing desks.

You **must** focus only on the following features of the concept design:

- laminate desktop with your choice of surface finish from the options given
- mild steel frame.

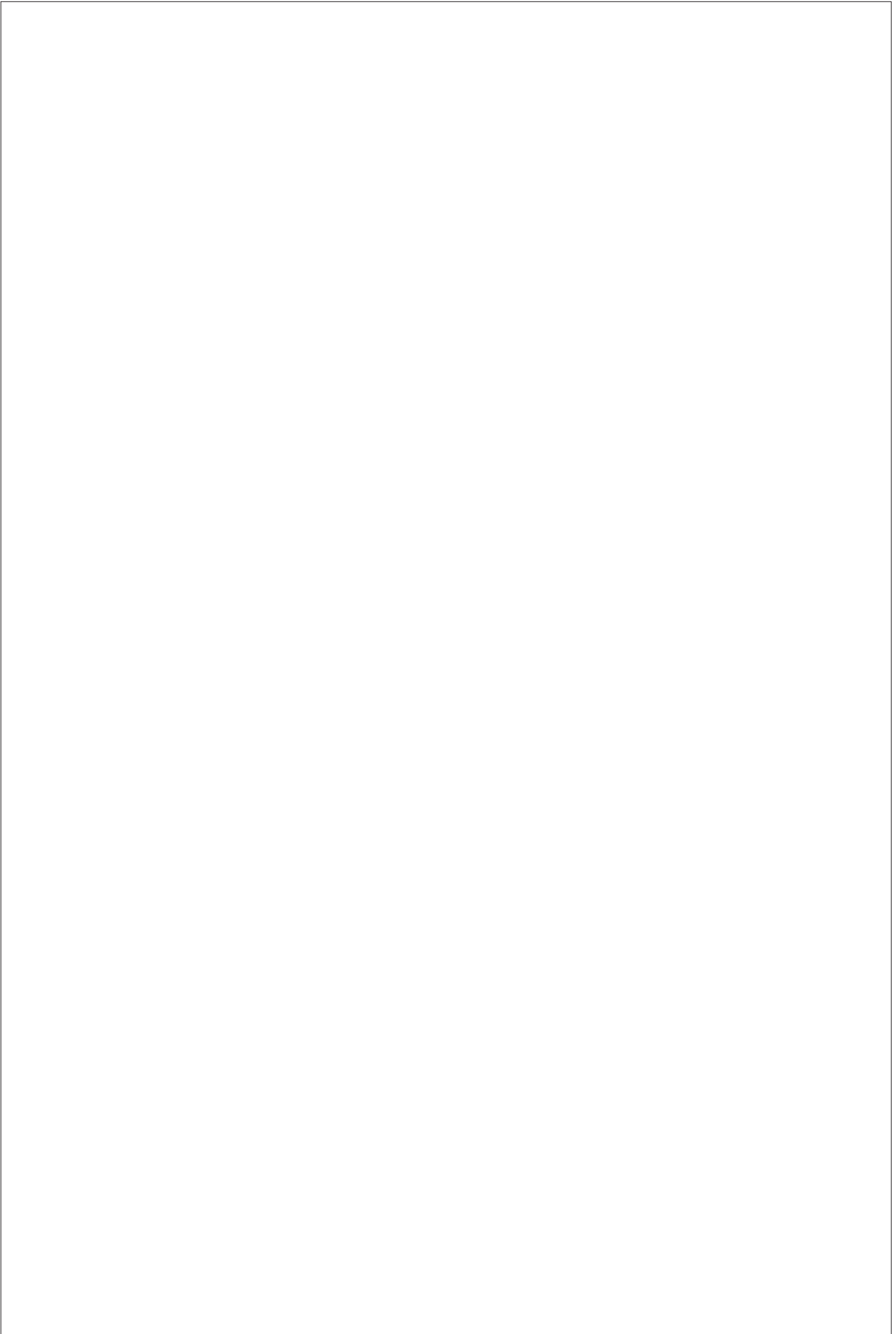
Use sketches and/or notes to outline suitable methods of manufacture and assembly for the features of the standing desk concept design as shown in **Fig. 5** of the Resource Booklet.

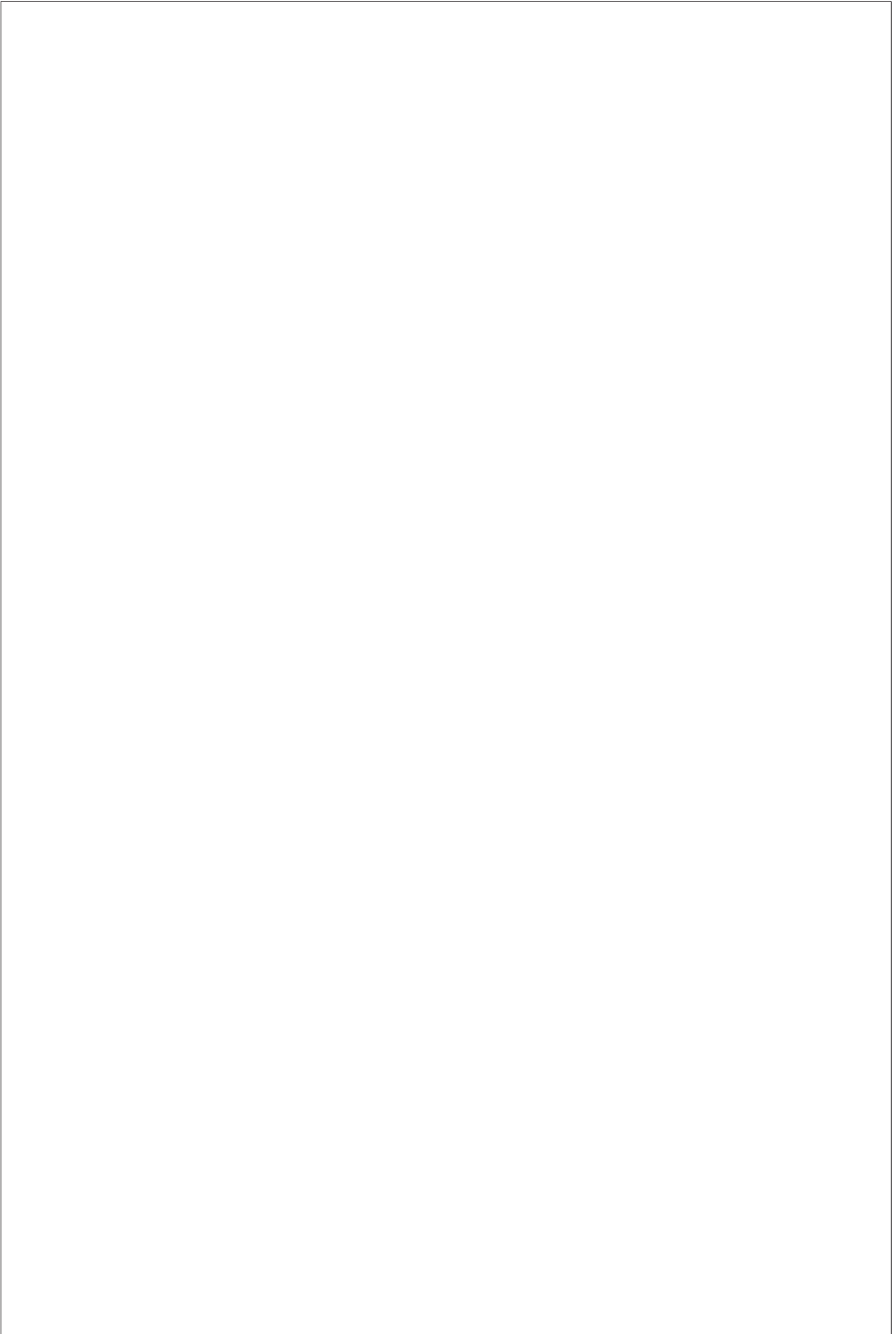
In your answer you **must** include details of:

- manufacturing processes
- standard components to be used
- finishes
- assembly methods.

[16]







- 6 The design team has developed a concept design called Easy-Stand for a standing desk converter.

In order to reduce weight, a prototype polymer laptop shelf has been designed and made to support the laptop.

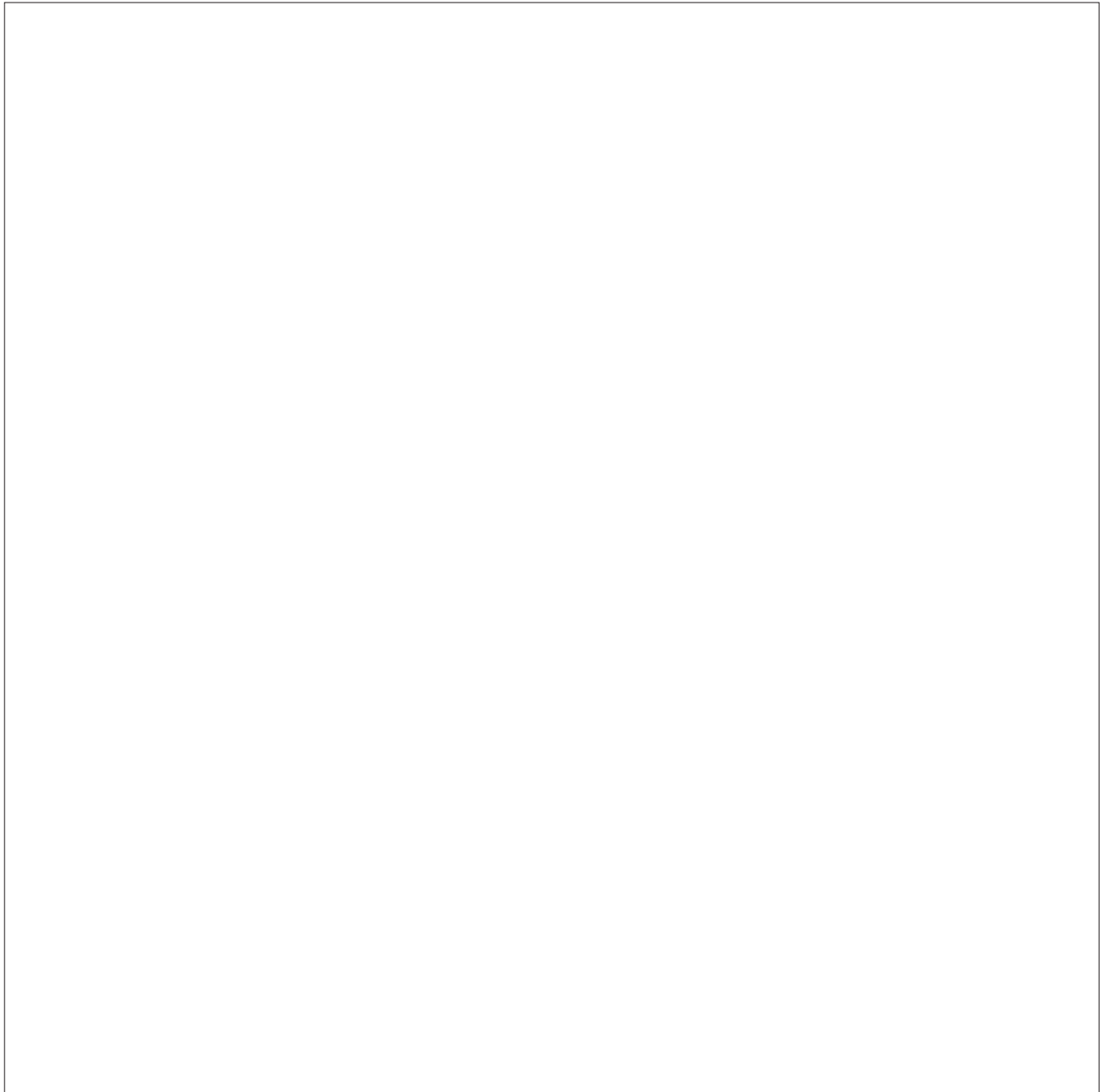
Smart Space requires an initial quantity of 100 polymer laptop shelves for consumer testing.

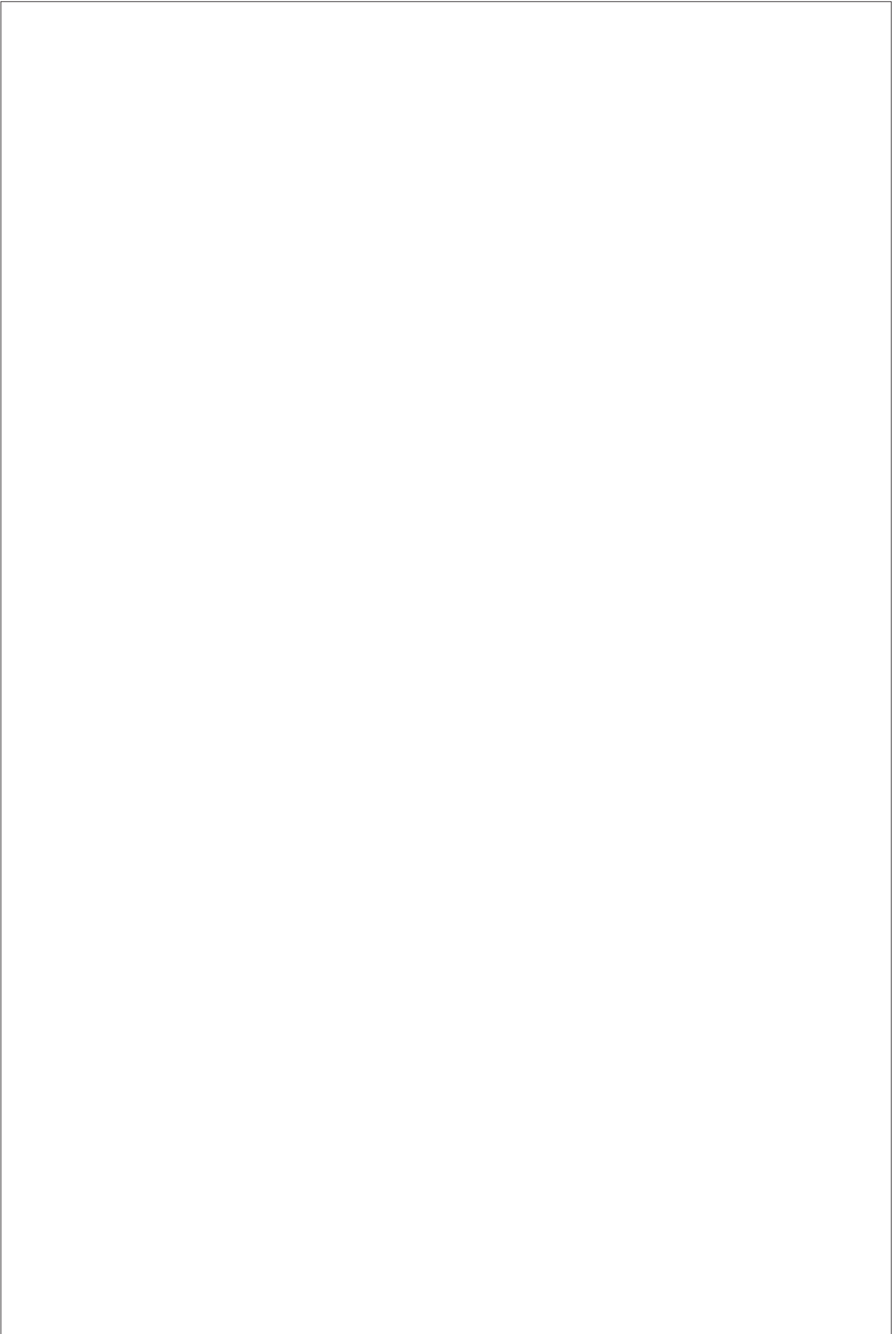
Use sketches and/or notes to outline suitable methods to meet the following design and manufacturing requirements for the **polymer laptop shelf only**:

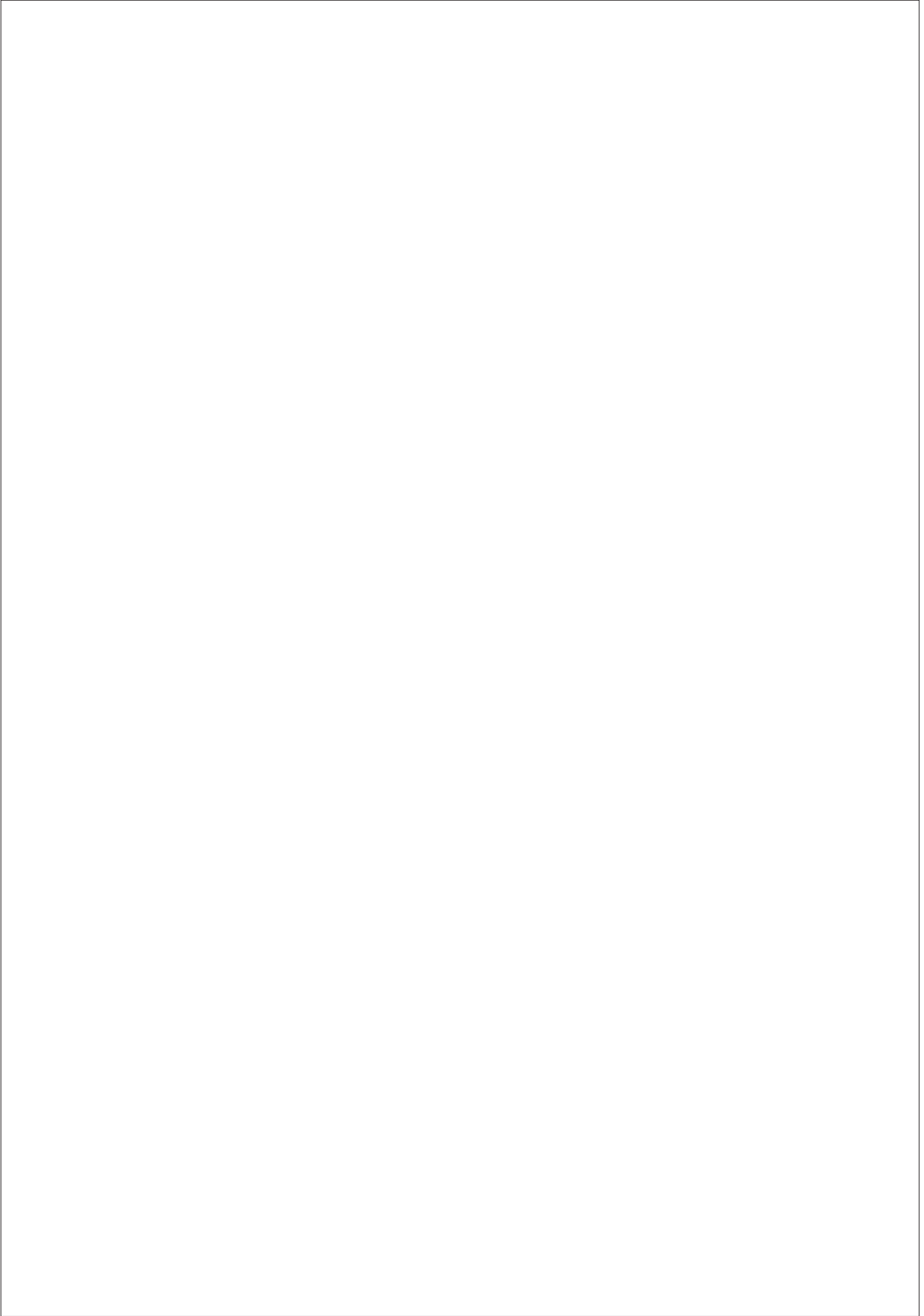
- include a non-slip texture to the shelf top surface
- provide structural reinforcement
- batch manufacture 100 polymer laptop shelves
- take account of design for manufacture (DFM).

Refer to information on **pages 7–8** of the Resource Booklet.

[12]







END OF QUESTION PAPER

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