



Oxford Cambridge and RSA

Monday 20 June 2022 – 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.

Answer **all** the questions.

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

1* A local city council aims to transform the way that residents and workers travel around the city in order to reduce travel congestion and improve air quality.

The councillor for transport and air quality is considering alternative transport options. Two of the options proposed are a bicycle rental scheme and an electric scooter rental scheme.

Critically examine the challenges that would be faced in implementing schemes of this nature.

In your answer you **must** consider the different needs and requirements of:

- existing road users
- pedestrians.

Refer to information on **page 2** and **page 3** of the Resource Booklet, specifically **Fig. 1**, **Fig. 2** and **Fig. 3**. **[12]**

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2* The council needs to assess the feasibility of operating an alternative transport scheme themselves or using a contractor.

Two of the options proposed are a bicycle rental scheme and an electric scooter rental scheme.

Compare and contrast the suitability of the existing products shown in **Fig. 4** and **Fig. 5** of the Resource Booklet for the proposed rental schemes.

In your answer you **must** consider the following:

- ergonomics
- required maintenance
- planned obsolescence.

Refer to information on **page 3** and **page 4** of the Resource Booklet, specifically **Fig. 4** and **Fig. 5**.

[12]

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- 4 Products such as the junior school scooter stand shown in **Fig. 8** of the Resource Booklet undergo quality control during manufacture to check that they meet the technical specification and satisfy manufacturing tolerances.

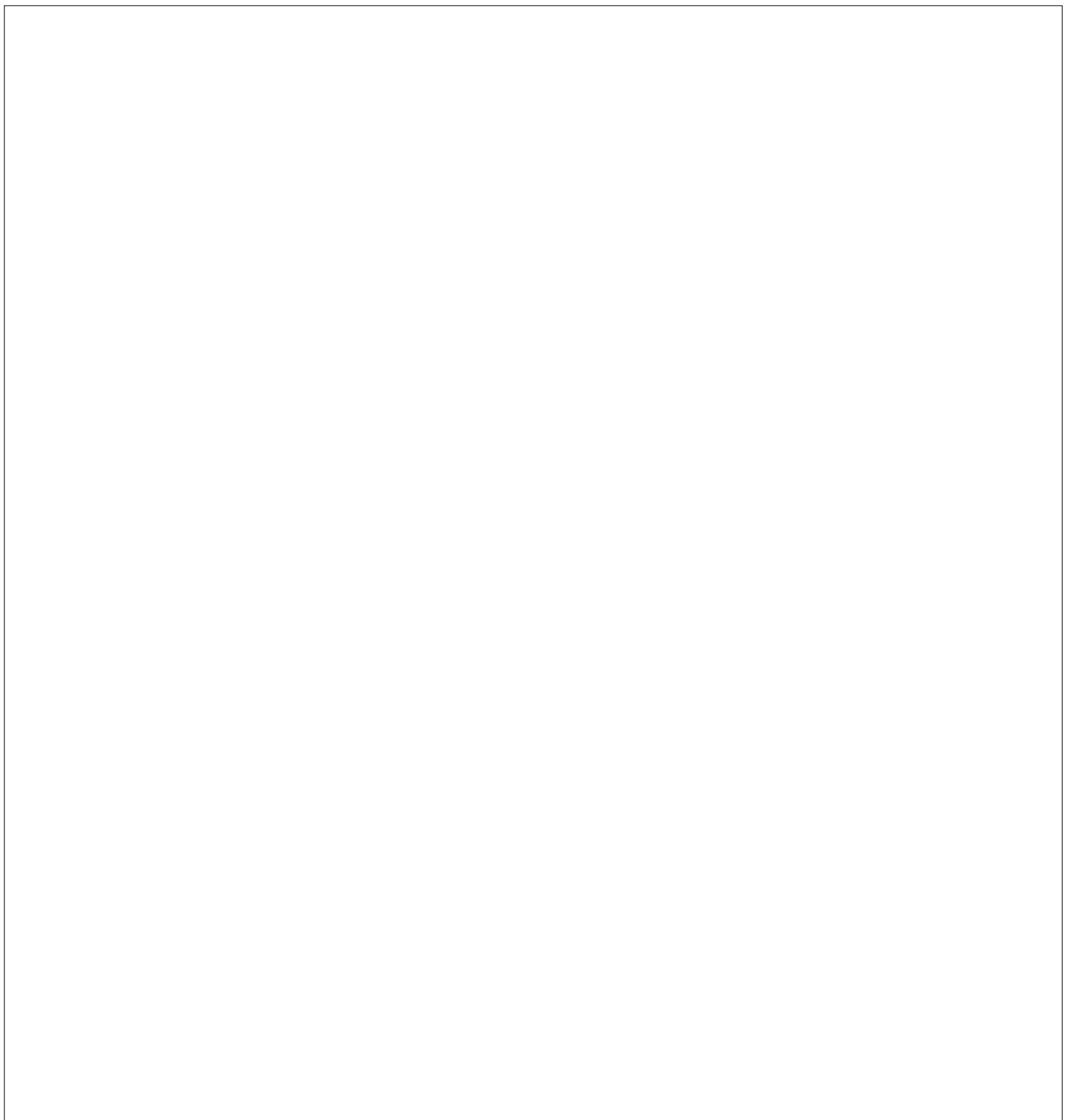
Use sketches and/or notes to show suitable methods of ensuring consistent accuracy and quality if 250 junior school scooter stands were commercially manufactured.

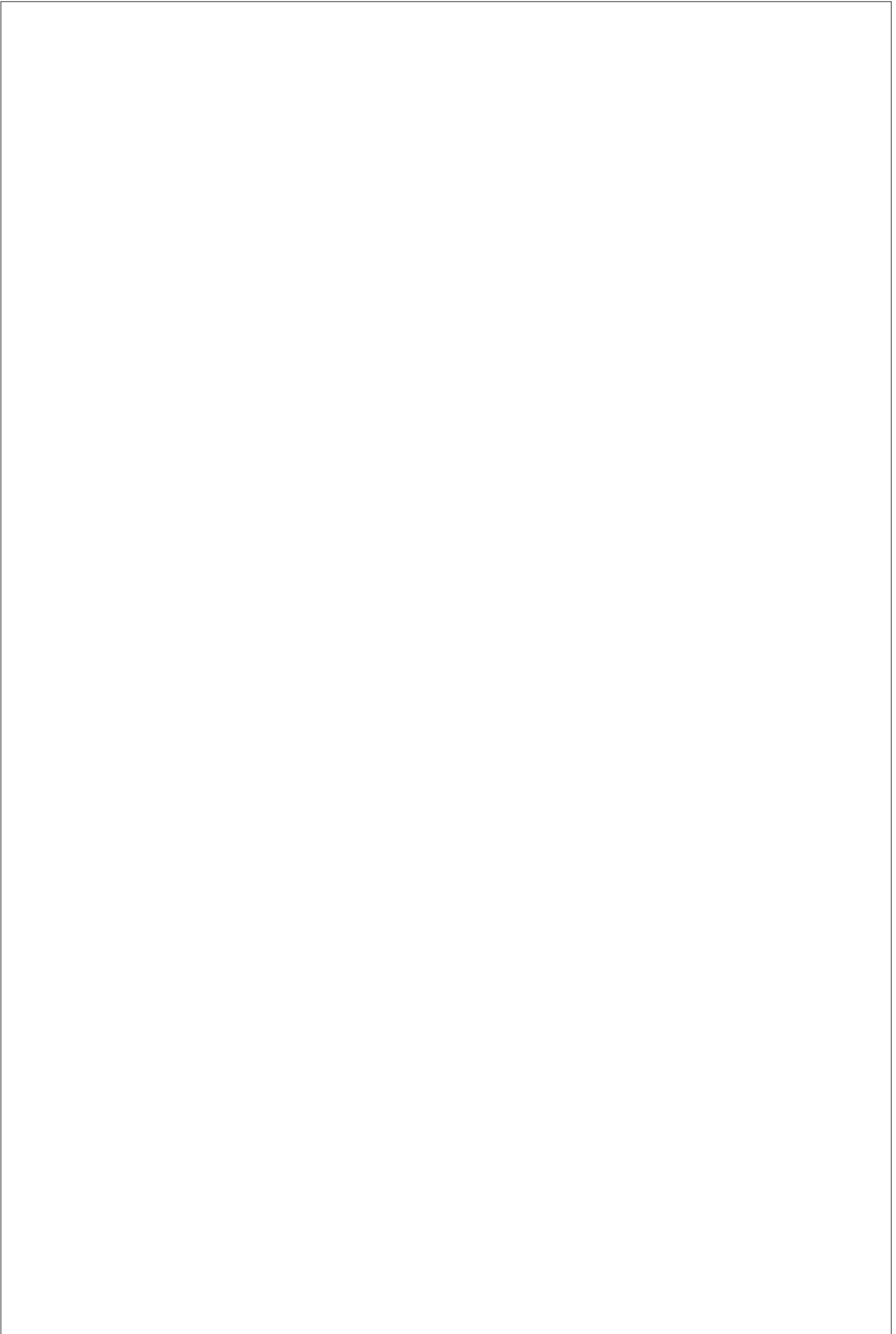
In your answer you **must** include references to the following:

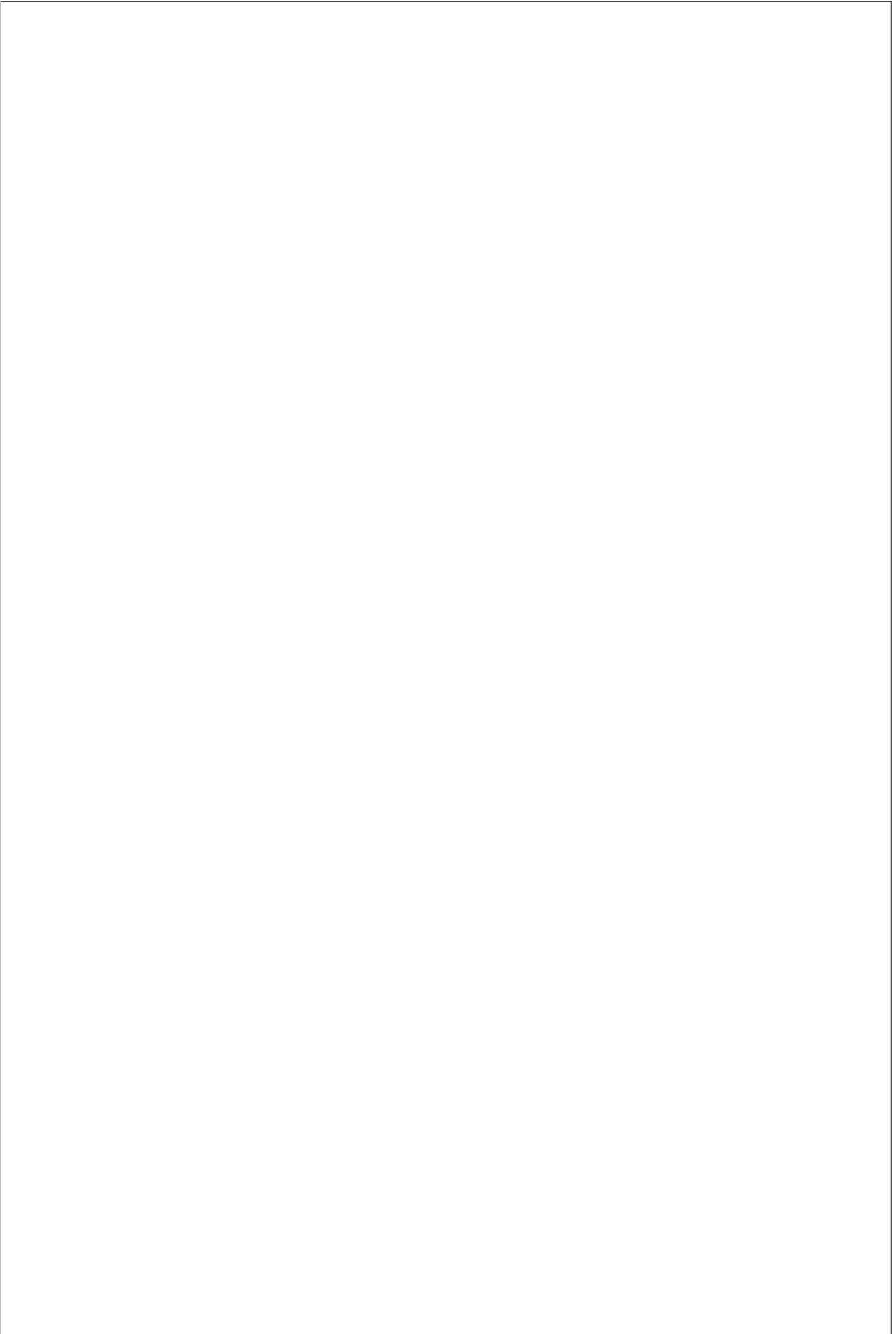
- jigs and templates
- visual checks
- accuracy of dimension checks
- digital manufacturing.

Refer to information on **page 6** of the Resource Booklet, specifically **Fig. 8**.

[16]







5 The manufacturer, 'Stand-up', is considering the commercial viability of the e-scooter stand.

As part of its cost analysis, the weight of the stand needs to be calculated.

Use the information in **Fig. 9** of the Resource Booklet to calculate the weight in g of the curved tube used in the e-scooter stand. Give your answer to **2** decimal places and show your working.

[6]

Weight of the curved tube used in the e-scooter standg

- 6 The designer has developed a concept design for an e-scooter station called Eco-shelter, shown in **Fig. 10** and **Fig. 11** of the Resource Booklet.

Use sketches and/or notes to outline suitable methods of manufacture and assembly for the features of the concept design taking account of the fact the council will require an initial quantity of 50 shelters.

You **must** focus on all parts of the concept design including the roof, timber frame and ground brackets.

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

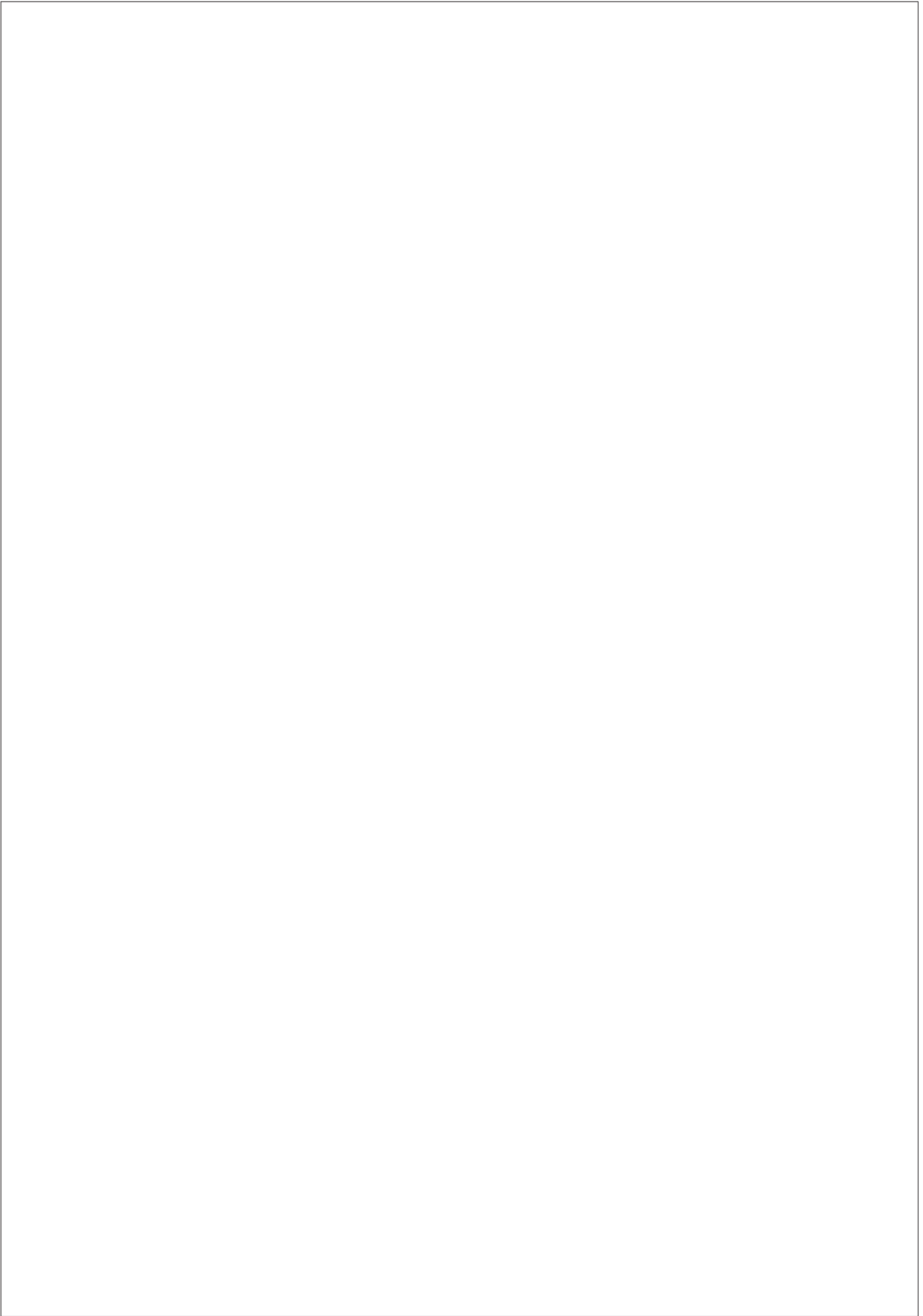
- specific materials
- manufacturing processes
- finishes
- assembly methods.

Refer to information on **page 7** and **page 8** of the Resource Booklet, specifically **Fig. 10** and **Fig. 11**.

[16]







END OF QUESTION PAPER

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