

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Friday 15 October 2021 – Morning**

**A Level in Design and Technology:  
Product Design**

**H406/02 Problem Solving in Product Design**

**Time allowed: 1 hour 45 minutes  
plus your additional time allowance**

**YOU MUST HAVE:**

**the Resource Booklet**

**Loose Sheet for Fig. 9 from the Resource Booklet**

**YOU CAN USE:**

**a ruler (cm/mm)**

**a scientific calculator**

**geometrical instruments**

**Please write clearly in black ink.**

**Centre number**

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**Candidate number**

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**First name(s)** \_\_\_\_\_

**Last name** \_\_\_\_\_

**READ INSTRUCTIONS OVERLEAF**



## **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 (\*).**

## **ADVICE**

**Read each question carefully before you start your answer.**

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**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 garden centre owner has identified an opportunity for an additional income stream.**

**A batch of insect hotels will be sold as part of a market research strategy to determine consumer interest.**

**Critically examine the challenges that would be faced to make the insect hotels from the upcycled materials shown in FIG. 3.**

**Your answer MUST consider the upcycled materials for the following parts:**

**roof  
tubes  
main body.**

**Refer to information on PAGES 2–7 of the Resource Booklet. [8]**

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[illegible]

- 2 The range of products shown in FIG. 4 has been developed to have common aesthetic properties to provide a strong brand image.**

**Consumer feedback indicates that the pastel paint finishes that complement the garden environment are a strong unique selling point of the product range.**

**Critically examine how these surface finishes can be applied to the product range.**

**Your answer MUST consider:**

**preparation of surfaces to ensure a quality outcome  
prevention of decay  
prevention of harm to wildlife  
any necessary risk assessments.**

**Refer to information on PAGES 8–9 of the Resource Booklet. [12]**

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[illegible]

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- 3\* Initial sales of the ‘Re-New’ range of garden centre accessories shown in FIG. 4 were extremely positive. All products within the range were popular with customers.**

**The garden centre owner is keen to maintain momentum with the expansion of the Re-New brand.**

**Critically evaluate the issues and specific requirements for the Re-New product range to expand. A significant increase in demand is expected.**

**Your answer MUST consider the following:**

**capacity of the existing workforce  
capacity of the existing manufacturing facilities  
opportunities for financial investment  
economy of scale.**

**Refer to information on PAGES 8–9 of the Resource Booklet. [12]**

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[illegible]

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- 4 The manufacturer, Apple Blossom, is considering the feasibility of making ‘Kwik slot’ garden planters from ‘Medite Tricoya Extreme’ (MTX).**

**Refer to FIG. 7 of the Resource Booklet.**

**Calculate the percentage waste of material from one Kwik slot garden planter side panel. Show your working.**

**Refer to information on PAGES 13–15 of the Resource Booklet. [6]**

**Waste material** \_\_\_\_\_ **%**

- 5 Apple Blossom is keen to bring the Kwik slot range of outdoor garden furniture to market.**

**The designers need to carry out quality assurance on the prototype furniture.**

**Products such as the chair in FIG. 8 undergo testing in order to check that they meet the technical specification and British Standards.**

**Use sketches and/or notes to outline suitable methods of testing the chair in FIG. 8.**

**Your answer MUST include testing for the following:**

**accuracy  
appearance  
functionality.**

**Refer to information on PAGES 16–17 of the Resource Booklet. [12]**









- 6 The manufacturer requires the chair design to be optimised for flat packing in order to lower transportation and storage costs.**

**An initial batch of 500 chairs will be made.**

**Use sketches and/or notes to show how the design of the chair in FIG. 8 and FIG. 9 could be modified for manufacture and assembly (DFMA).**

**Your answer MUST identify features that would:**

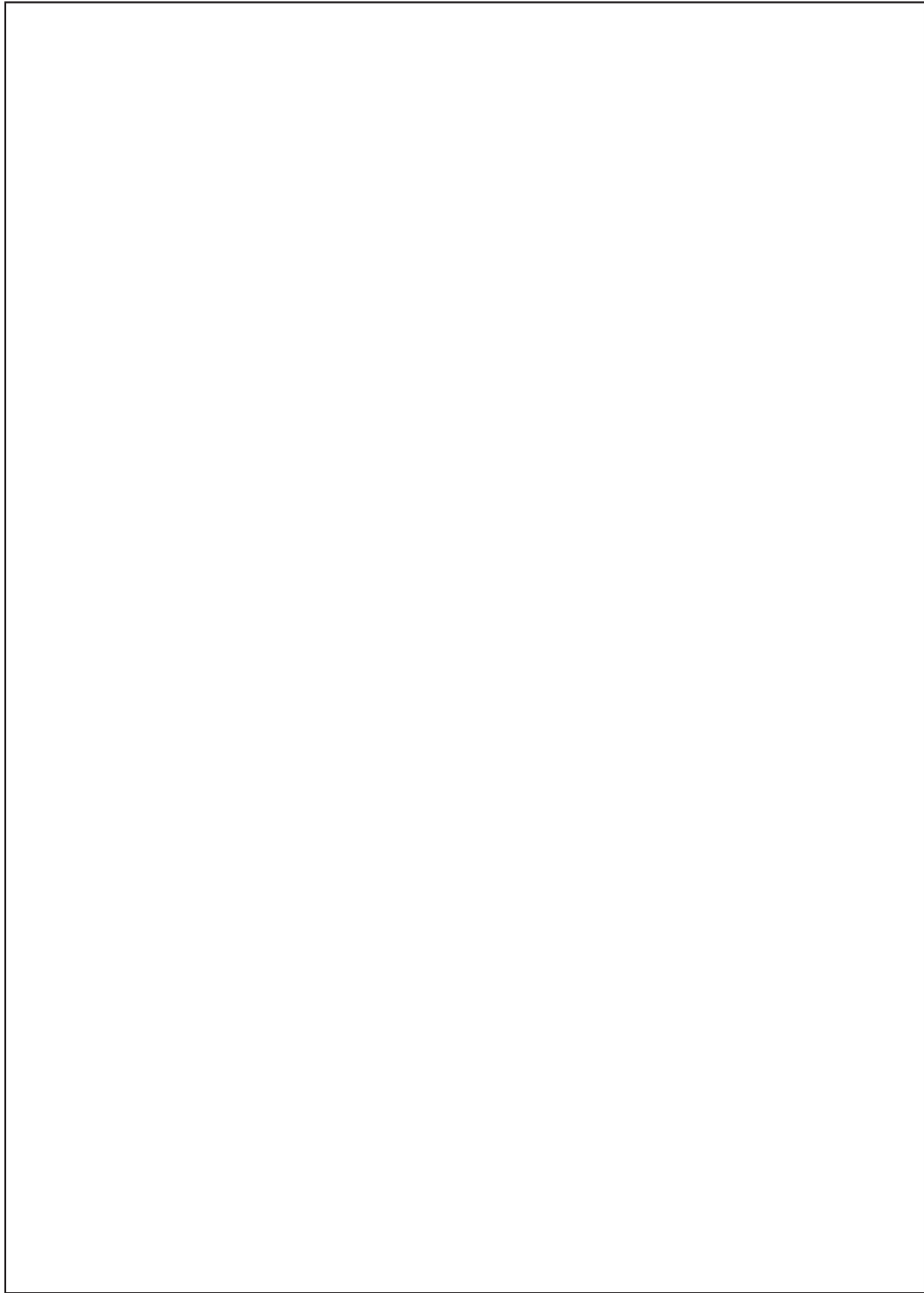
**minimise additional fixings  
simplify assembly  
provide structural integrity  
minimise waste material through tessellation.**

**In your answer you must provide details of the modifications necessary to make the product with an industrial CNC router. The end-user should be able to assemble the chair with little prior practical experience.**

**Refer to information on PAGES 16–17 of the Resource Booklet AND THE LOOSE SHEET. [20]**







**END OF QUESTION PAPER**

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