Cambridge Assessment International Education

Cambridge International AS & A Level

DESIGN & TECHNOLOGY **9705/32**

Paper 3 **May/June 2023**

3 hours

4299077701

You must answer on the answer booklet/paper.

You will need: Answer booklet/paper
A3 drawing paper (5 sheets)
A range of design drawing equipment
Coloured pencils

INSTRUCTIONS

- Answer **three** questions in total:
  - Section A: answer **two** questions from **one** of the Parts A, B or C.
  - Section B: answer **one** question.
- If you have been given an answer booklet, follow the instructions on the front cover of the answer booklet.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number on all the work you hand in.
- Do **not** use an erasable pen or correction fluid.
- You may use an HB pencil, or coloured pencils as appropriate, for any diagrams, graphs or rough working.
- At the end of the examination, fasten all your work together. Do **not** use staples, paper clips or glue.

INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [ ].
- All dimensions are in millimetres.

This document has **12** pages. Any blank pages are indicated.

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Section A

Answer **two** questions from **one** of the Parts **A**, **B** or **C**.

Part A – **Product Design**

The instruction 'discuss' denotes that you should:

- examine critically the issues raised by the question
- explain and interpret these issues as appropriate
- introduce evidence wherever possible to support conclusions of arguments.

1 Fig. 1.1 shows details of a support for a flat-pack bookshelf.

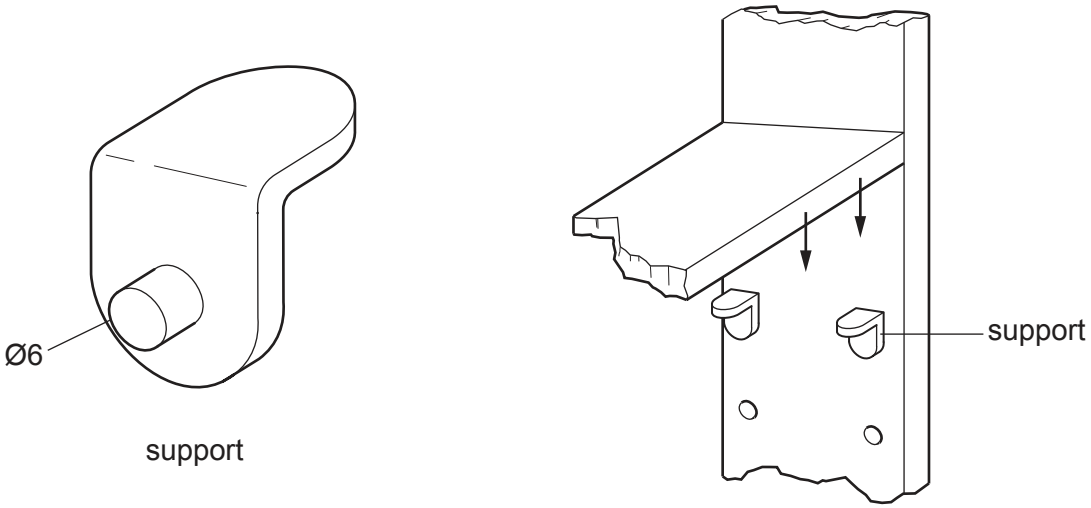


Fig. 1.1

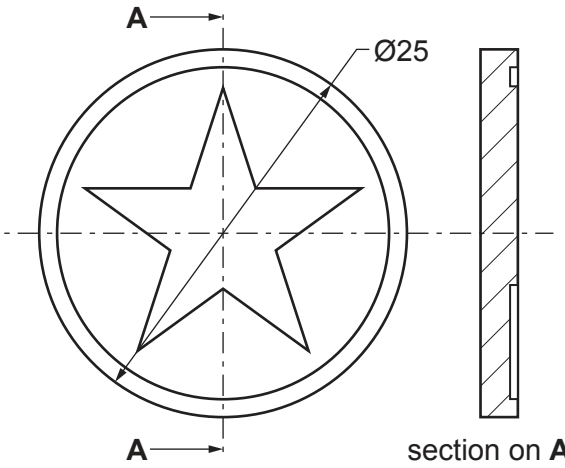
(a) State a suitable material for the support for a bookshelf of the type shown in Fig. 1.1 and give **two** reasons for your choice. [3]

(b) Use sketches and notes to describe how you would make one support for the bookshelf in a school workshop. [9]

(c) Explain the changes which would be necessary to the design, the manufacturing method used and the material selected, if 50 000 identical supports for a bookshelf were required. Use sketches and notes to support your answer. [8]

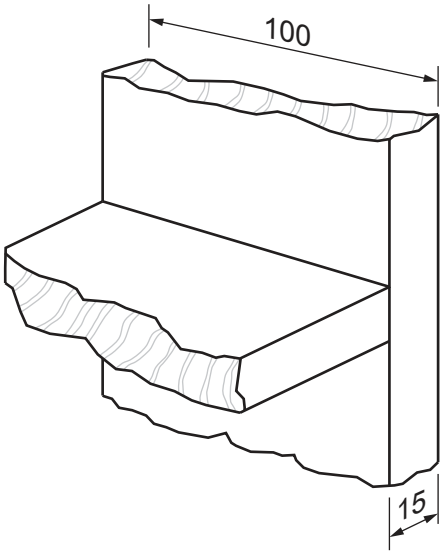
2 Discuss the importance of modelling in the design and development of products. [20]

3

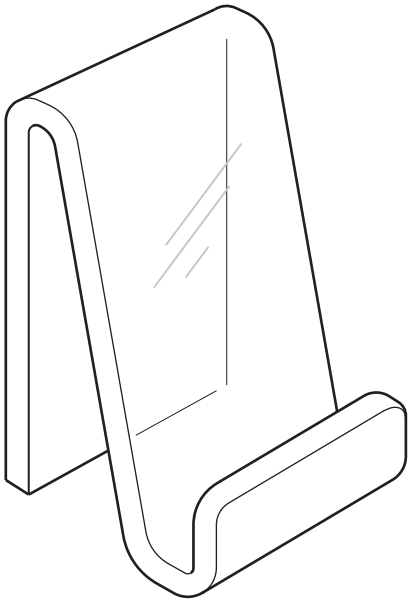


section on **AA**

item: achievement badge
material: copper
process: etching



item: storage unit
material: pine
process: stopped housing joint



item: phone holder
material: clear acrylic
process: line bending

Fig. 3.1

Choose **two** of the items shown in Fig. 3.1. For **each**:

(a) use sketches and notes to describe how the process has been used in the manufacture of the item [14]

(b) explain why the process is particularly suitable for the production of the item. [6]

Part B – **Practical Technology**

The instruction ‘discuss’ denotes that you should:

- examine critically the issues raised by the question
- explain and interpret these issues as appropriate
- introduce evidence wherever possible to support conclusions of arguments.

4 Fig. 4.1 shows three garden tables.

wooden table metal table plastic table

Fig. 4.1

Compare the benefits and drawbacks of using wood, metal and plastic for garden tables with reference to:

(a) aesthetics and physical properties [6]

(b) manufacture and cost [10]

(c) maintenance. [4]

Refer to at least one specific wood, metal and plastic material for each table in your response.

5 Discuss the implications of built in obsolescence with reference to ongoing technological development. [20]

6 **(a)** Describe how the following are used in the testing of the performance of materials or prototypes.
Use **one** example for each to support your answer.

(i) photoelasticity [3]

(ii) strain gauge [3]

(b) **(i)** State a material that has good torsional strength. [1]

(ii) Describe the suitability of the material given in part **(b)(i)** in a product or component that requires torsional strength. [3]

(c) Describe **three** ways in which manufacturers ensure that products are safe to use. [10]

Part C – **Graphic Products**

The instruction ‘discuss’ denotes that you should:

- examine critically the issues raised by the question
- explain and interpret these issues as appropriate
- introduce evidence wherever possible to support conclusions of arguments.

7 Fig. 7.1 shows a card model of a design for a lantern.

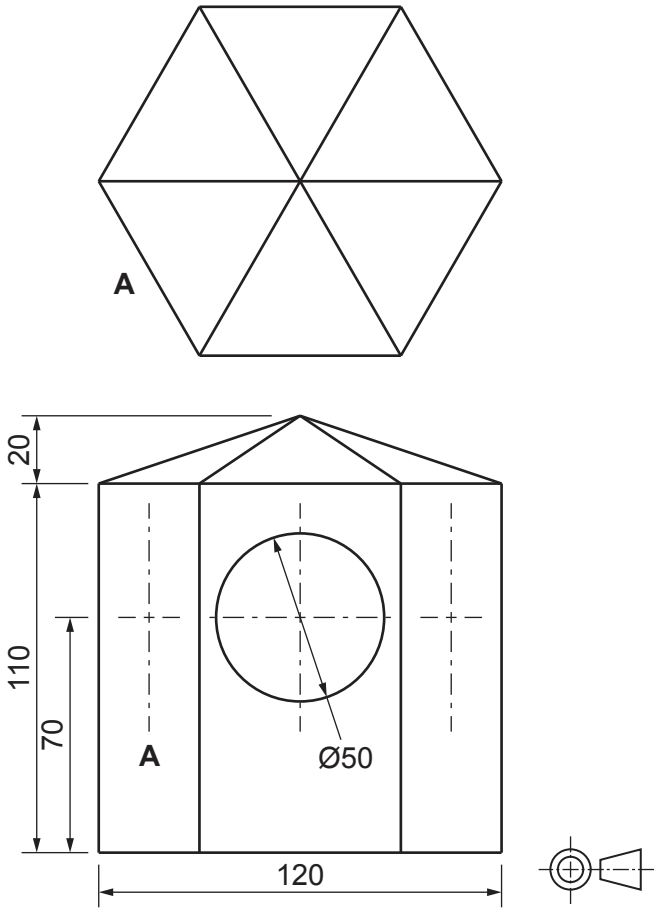


Fig. 7.1

The lantern has a Ø50 hole cut in the same position on each face.

(a) (i) Draw full-size the given plan and elevation. [6]

(ii) Construct the hole on face **A**. Ignore card thickness. [4]

(b) Discuss the importance of formal drawing techniques, such as orthographic projection, to designers and engineers. [10]

8 **(a)** Use sketches and notes to explain how and why each of the following is used in a design situation:

(i) a cut-away drawing [5]

(ii) an exploded drawing [5]

(iii) a two point perspective drawing. [5]

(b) Explain the benefits of using free-hand sketching when designing a product. [5]

9 **(a)** Fig. 9.1 shows three boxes, **A**, **B** and **C**, which house different mechanisms.

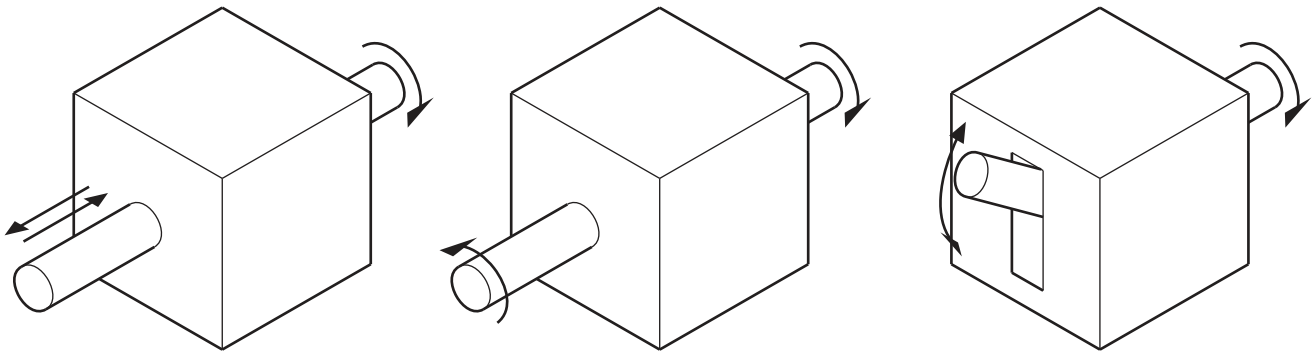


Fig. 9.1

The boxes house mechanisms which will transfer rotational motion, shown on the right-hand side of each box, to the required outcome, indicated by arrows on the left-hand side of each box.

Use sketches and notes to show how transfer of motion could be achieved in each of the boxes **A**, **B** and **C**. [12]

(b) Fig. 9.2 shows a simple mechanism.

A rotates about **O**.
B is constrained to follow line **CD**.

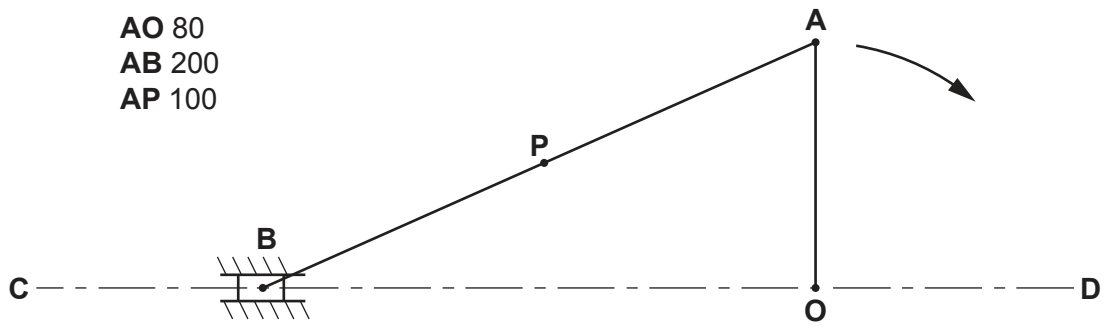


Fig. 9.2

Plot the locus of point **P** for one full revolution of **AO**. [8]

Section B

Answer **one** question on the A3 paper provided.

Each question is worth 80 marks.

You should approach the design question of your choice in the following manner:

Analysis

Produce an analysis of the given situation/problem, which may be in written or graphical form. [5]

Specification

From the analysis produce a detailed written specification of the design requirements.
Include at least five specification points other than those given in the question. [5]

Exploration

Use bold sketches and brief notes to show your exploration of ideas for a design solution, with reasons for selection. [25]

Development

Show using bold sketches and notes, the development, reasoning and composition of ideas into a single design proposal. Give details of materials, constructional and other relevant technical details. [25]

Proposed solution

Produce drawings of an appropriate kind to show the complete solution. [15]

Evaluation

Give a written evaluation of the final design solution. [5]

10 A restaurant wishes to provide diners with a range of sauces or dips when they eat. The restaurant tables are circular and can seat up to 8 diners.

You are to design a product to hold six different sauces or dips, to be placed on a restaurant table.

The product must allow:

- ease of access to all sauces or dips by all diners at the table
- each sauce or dip to be refilled during the meal.

[80]

11 A school for children aged 5 to 11 years wants to encourage them to use recyclable waste collection facilities around the school.

A container that will encourage children to place different types of recyclable waste in separate sections would be helpful.

You are to design a container that can be manufactured as a batch of 10.

The container must:

- clearly show what type of recyclable waste is to be collected in each section
- produce a noise or light effect when a child places recyclable waste in the section.

[80]

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12 A garden centre is to take part in an initiative to encourage customers to plant a tree.

You are to design:

- packaging to enable a customer to take home a tree sapling
- a logo for the packaging that reflects the tree planting initiative.

The packaging must:

- hold securely a tree sapling and sufficient compost
- clearly show the tree sapling.

Details of a tree sapling are given in Fig. 12.1.

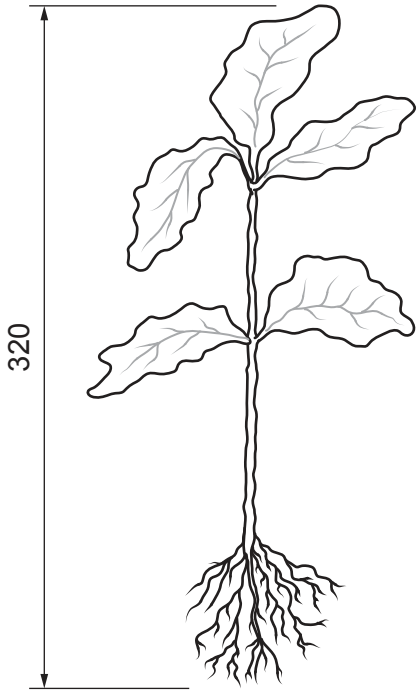

Fig. 12.1

[80]

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