



Cambridge International AS & A Level

DESIGN & TECHNOLOGY

9705/33

Paper 3

October/November 2020

3 hours



You must answer on the answer booklet/paper.

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

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. Blank pages are indicated.

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 a leaflet holder.

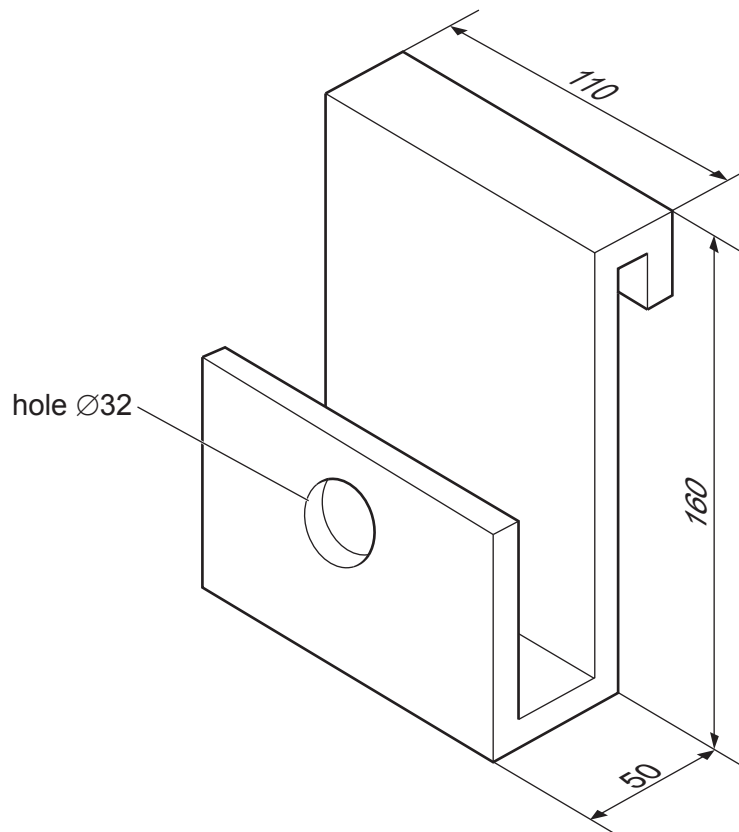


Fig. 1.1

- State a suitable material for a leaflet holder of the type shown in Fig. 1.1 and give **two** reasons for your choice. [3]
- Use sketches and notes to describe how you would make one leaflet holder. [9]
- Explain the changes which may be necessary to the design, the manufacturing method used and the material selected, if 50 identical leaflet holders were required. Use sketches and notes to support your answer. [8]

2 Designers may be influenced by a wide variety of factors.

Discuss ways in which the following factors may influence the work of a designer.

- environmental
- economic
- cultural

[20]

3

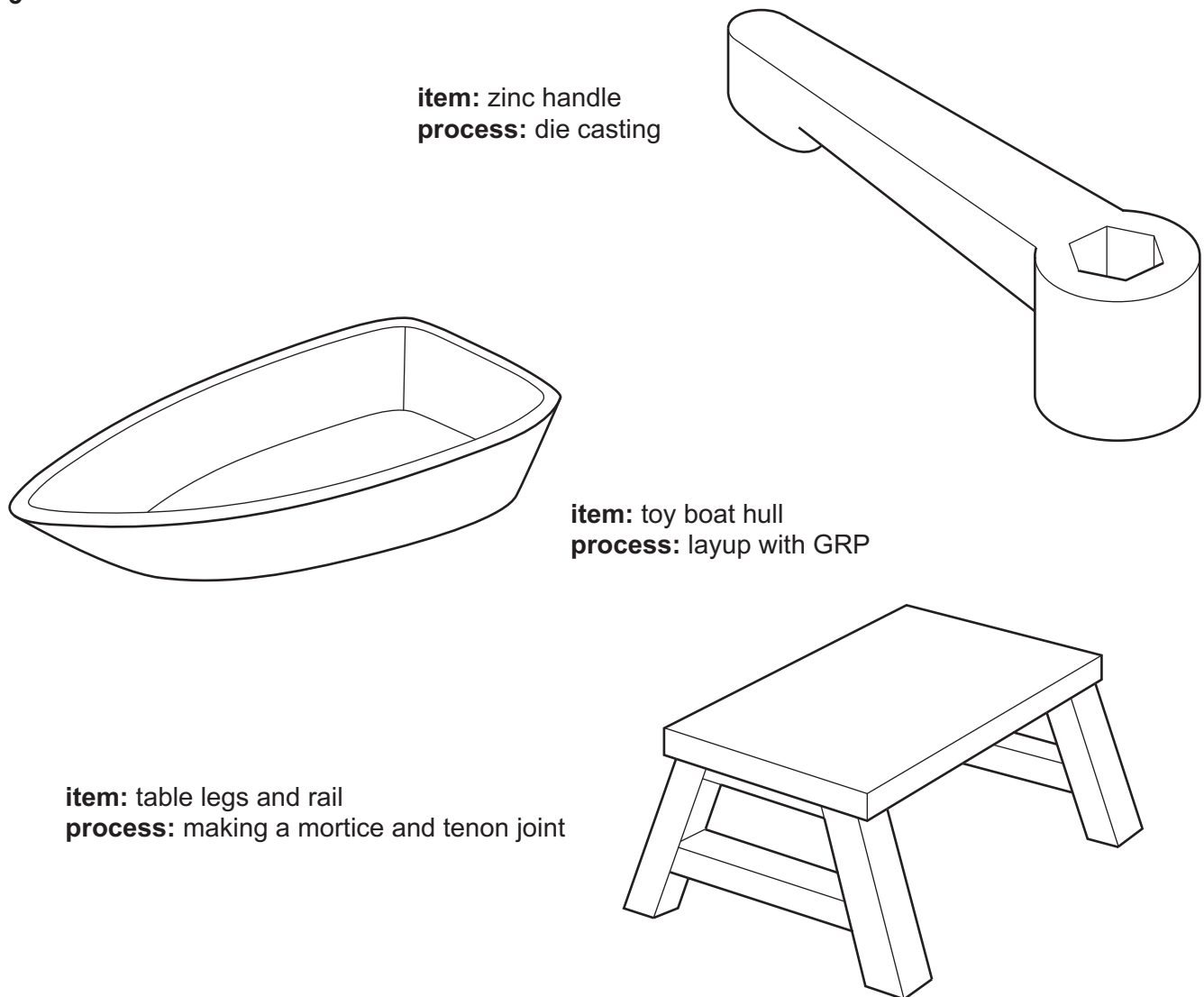


Fig. 3.1

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 in 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 (a) Use sketches and notes, where appropriate, to explain what is meant by the following terms with reference to structures.

(i) Equilibrium [3]

(ii) Resolution of forces [3]

(iii) Triangulation [3]

(iv) Monocoque [3]

(b) Explain, using examples, how structures can be tested using non-destructive methods. [8]

5 (a) Calculate the current flowing through a $270\ \Omega$ resistor if 9 volts is applied across it. [2]

(b) Explain the working of **three** of the following.

- Reed switch
- Darlington pair
- Zener diode
- Relay [9]

(c) Control systems use sensors to monitor variations in the environment being controlled.

Describe the sensors that would be used, and how they would control:

- the temperature in a greenhouse
- the level of illumination in a room
- the level of water in a bath. [9]

6 (a) Use sketches and notes to describe **two** of the following processes.

- plastic (resin) casting
- parting off on a lathe
- blow moulding [12]

(b) Compare and contrast the processes of electric and gas welding. Give specific examples of the application for each welding method to support your answer. [8]

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 the plan of a small classroom.

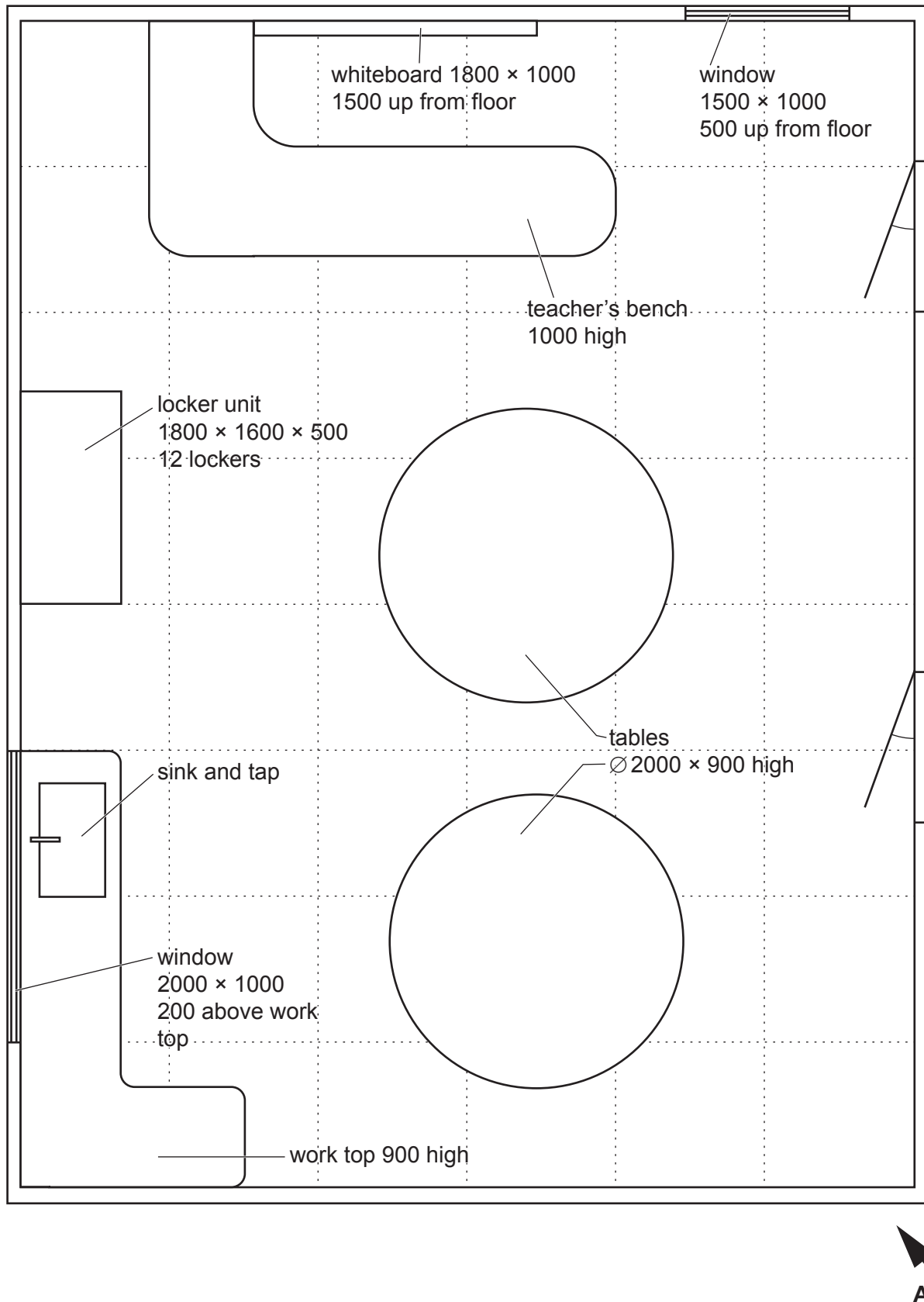


Fig. 7.1

Draw, to an approximate scale, a planometric drawing of the classroom viewed from arrow **A**.
[20]

- 8 Graphic designers use a range of techniques to present information that is clear and easy to understand.

Use sketches and notes to explain the following techniques, giving an example for each.

- bar charts
- tables
- pictograms
- graphs

[20]

- 9 Discuss the impact of computers in the design and manufacture of products.
Consider in your answer:

- the generation and presentation of design ideas
- opportunities for collaborative work
- the integration of data for costing, stock control and production.

[20]

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** Environmental Agencies are to provide compostable bags to encourage households to recycle food waste.

A product to be used in a kitchen to collect food waste is required.

The product must:

- be freestanding and/or attached to a wall in a kitchen
- allow easy insertion and removal of compostable bags measuring 250 × 200 × 180. [80]

- 11** Maintaining and repairing bicycles can be an awkward and difficult task.

You are to design a product that can support a bicycle whilst work is being carried out.

The product must:

- be adjustable in height
- hold the bicycle without damaging its surface finish. [80]

- 12** A school wishes to organise a Fun Run to raise funds to support a project that focusses on a single environmental issue.

Select an environmental issue for the project.

You are to design:

- a name and logo for the project
- an interactive display unit to be situated in the main reception area of the school.

The interactive display unit must:

- be freestanding and hold up to 25 A4 information sheets
- reflect the image of the project. [80]

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