



Cambridge International AS & A Level

DESIGN & TECHNOLOGY

9705/32

Paper 3

May/June 2022

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 **8** pages. Any 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 details of an earphone holder.

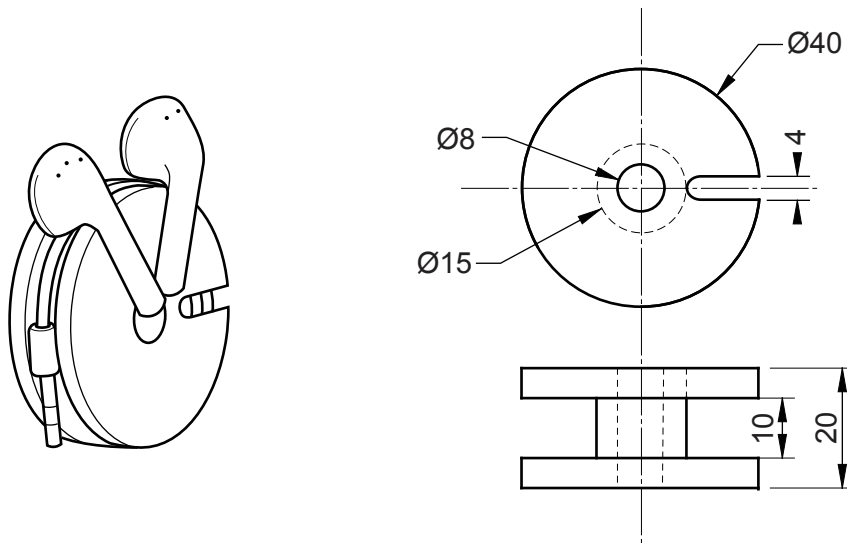
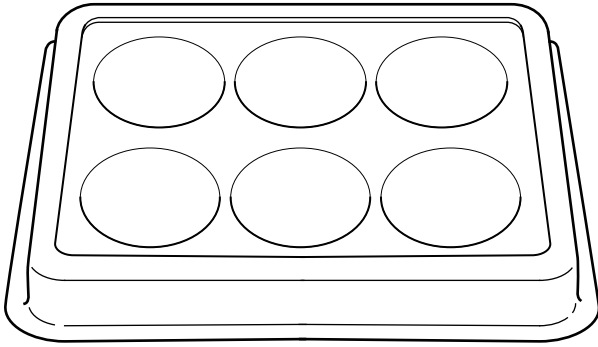


Fig. 1.1

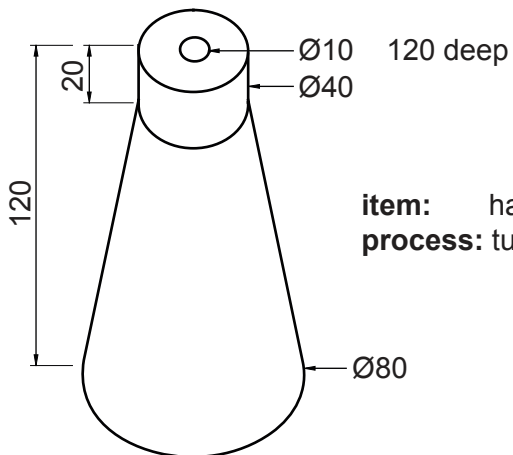
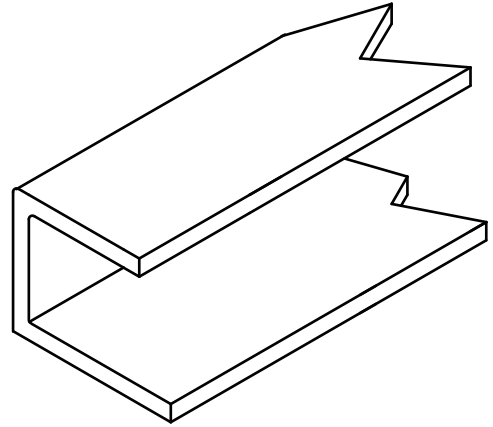
- (a) State a suitable material for an earphone holder of the type shown in Fig. 1.1 and give **two** reasons for your choice. [3]
- (b) Use sketches and notes to describe how you would make an earphone holder in a school workshop. [9]
- (c) Explain the changes which may be necessary to the design, the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

- 2 Discuss how unit costs and available manufacturing processes influence a designer when selecting materials for **two** of the following: [20]
- a mass-produced paper clip
 - a one-off item of jewellery
 - a batch of 20 stools for a café.



item: HIPS tray
process: vacuum forming

item: aluminium picture frame
process: extrusion



item: hardwood lamp base
process: turning and boring

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 Explain the benefits and drawbacks of each of the following ways of achieving motion in a system or product:

- electrical
- mechanical.

Give an appropriate example of an application where each may be used.

[20]

5 Fig. 5.1 shows a circuit to control a motor.

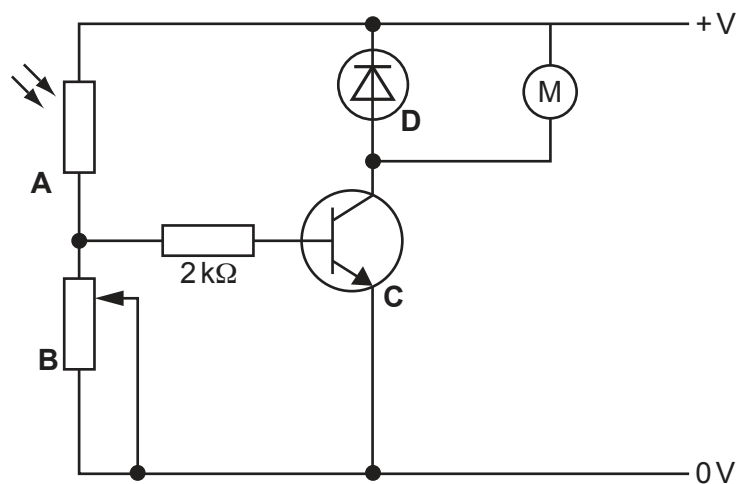


Fig. 5.1

(a) (i) Identify **and** describe the function of components **A**, **B**, **C** and **D**. [8]

(ii) Describe the function of the $2\text{ k}\Omega$ resistor. [2]

(b) Discuss the importance of innovation and evolution in the development of new products. [10]

6 (a) Use sketches and notes to describe in detail the following joining processes:

(i) Hard soldering (brazing) a $\text{Ø}10$ mild steel bar into a drilled hole in 10 mm thick mild steel. [6]

(ii) Soft soldering a resistor onto a printed circuit board (PCB). [6]

(b) Use **two** examples to explain the advantages of using adhesives, rather than mechanical fixings or heat, to join materials together. [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 a design for a hotel room.

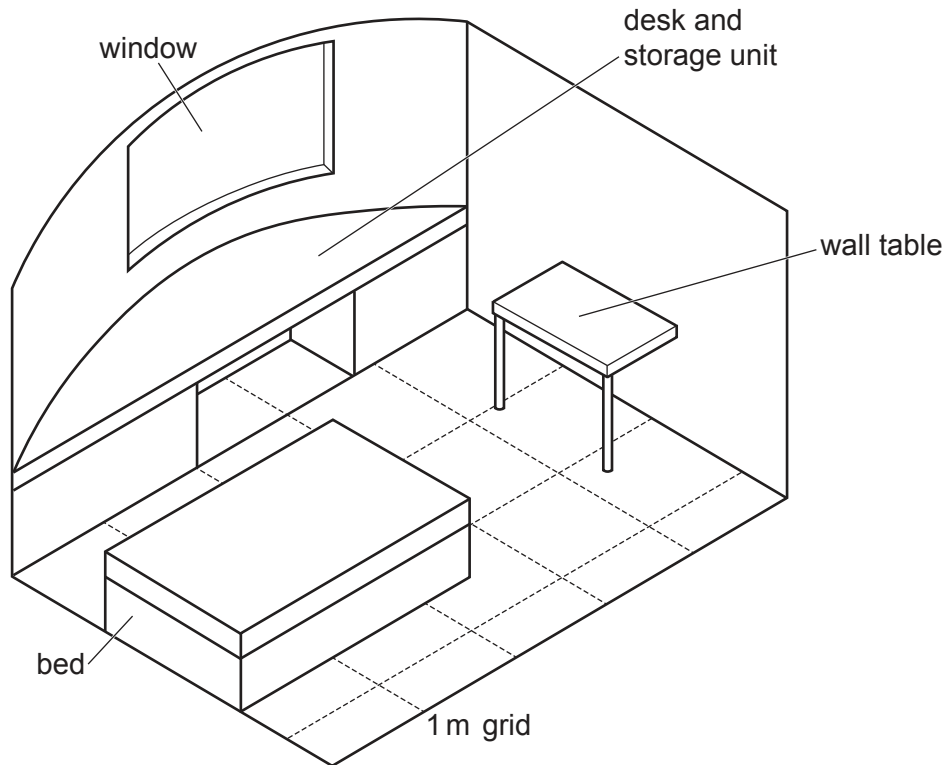


Fig. 7.1

(a) State suitable materials that could be used to make a small scale presentation model of the hotel room shown in Fig. 7.1 and give reasons for your choice. [5]

(b) Use sketches and notes to describe how a small scale presentation model of the hotel room, shown in Fig. 7.1, could be made in a school workshop. [15]

8 Designers use a variety of techniques to record, manipulate and present information.

Use sketches and notes to explain **four** of the following, giving an example of the application for each technique:

- flow charts
- graphs
- ideograms
- pictograms
- pie charts.

[20]

9 Discuss the influence of fashion and style on the work of designers.

[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 A restaurant wishes to increase its business by providing a delivery service.

You are to design a product that could be attached to a bicycle to carry food items, in polypropylene cartons, for delivery.

The product must:

- include a way of keeping customer orders separate and easy to identify
- be easily removed from the bicycle.

The type of bicycle to be used and details of the polypropylene food carton are shown in Fig. 10.1.

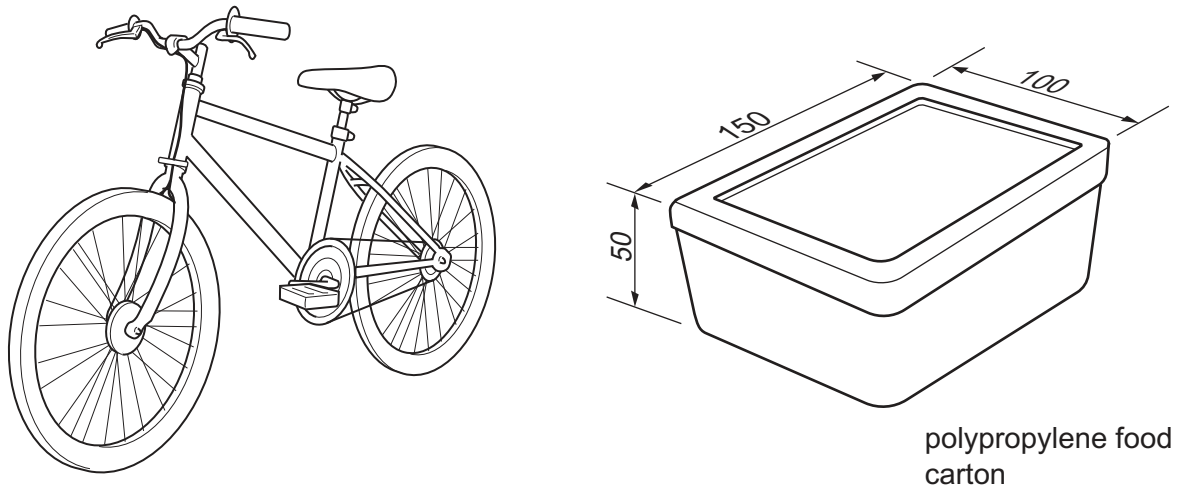


Fig. 10.1

[80]

11 The movement of spectators at outdoor events is often controlled by barriers.

You are to design a barrier system suitable for use at a variety of outdoor events.

The barrier system must:

- be easy to erect and dismantle
- be easy to transport between events.

[80]

12 A supermarket wishes to introduce a weekly local delivery service for organic fruit and vegetables.

You are to design:

- a name and logo for the delivery service
- a free-standing display to promote the delivery service
- a reusable carrier to deliver a weekly supply of organic fruit and vegetables, displaying the name and logo, and suitable for production in batches of 1000.

[80]

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