



Cambridge International AS & A Level

DESIGN & TECHNOLOGY

9705/32

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 storage box to hold small metal components.

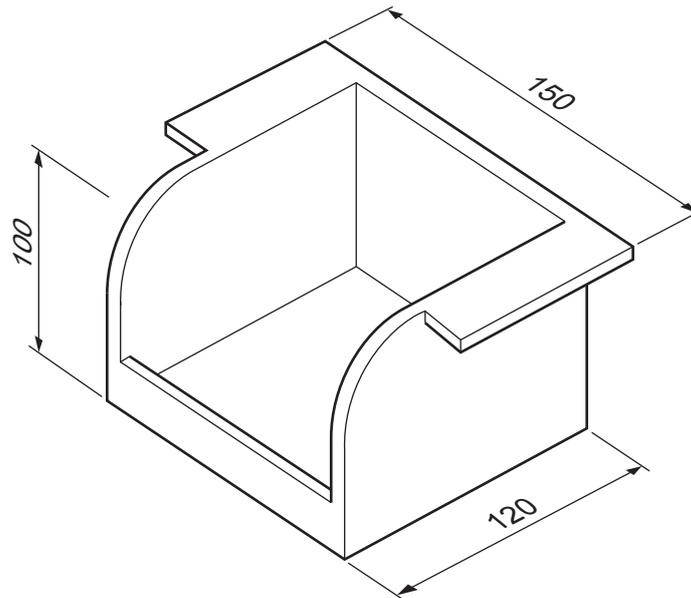
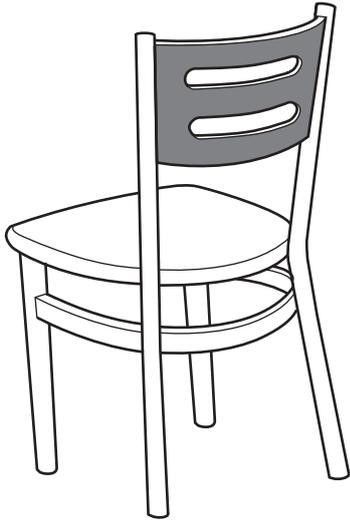


Fig. 1.1

- (a) State a suitable material for a storage box 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 storage box. [9]
- (c) Explain the changes which may be necessary to the design, the manufacturing method used and the material selected, if 100 identical storage boxes were required. Use sketches and notes to support your answer. [8]

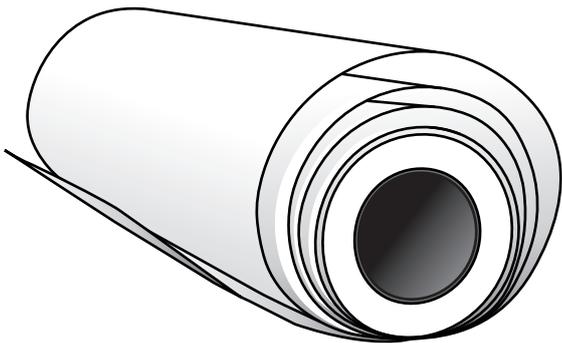
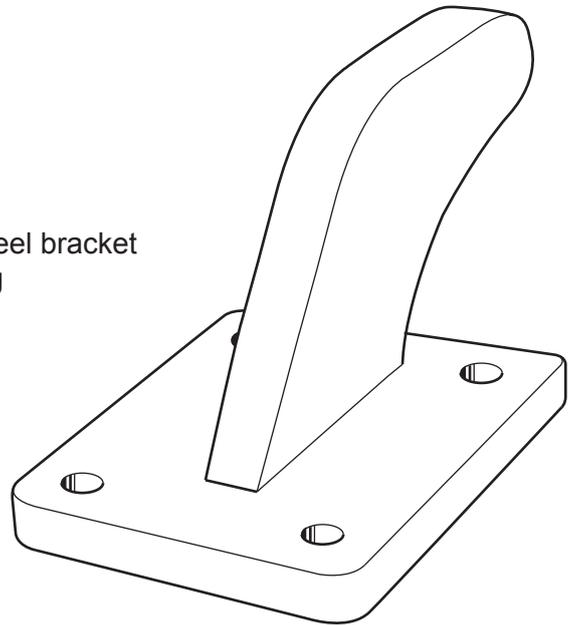
2 The rapid development of technology has greatly increased the producer-led market. Discuss the implications of new technologies and trends for consumers and for manufacturers. [20]

3



item: chair back
process: laminating

item: mild steel bracket
process: brazing



item: PVC roll
process: calendering

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) Define the following properties relating to materials.

- hardness
- stiffness

[2]

(b) State **one** material that is hard and **one** material that is stiff.

[2]

(c) Use sketches and notes to describe a method that could be carried out in a workshop to compare the stiffness of different materials. [10]

(d) Explain the importance of the data obtained from material testing to a designer when developing new products. [6]

5 (a) Fig. 5.1 shows a circuit for a games timer and details of the IC.

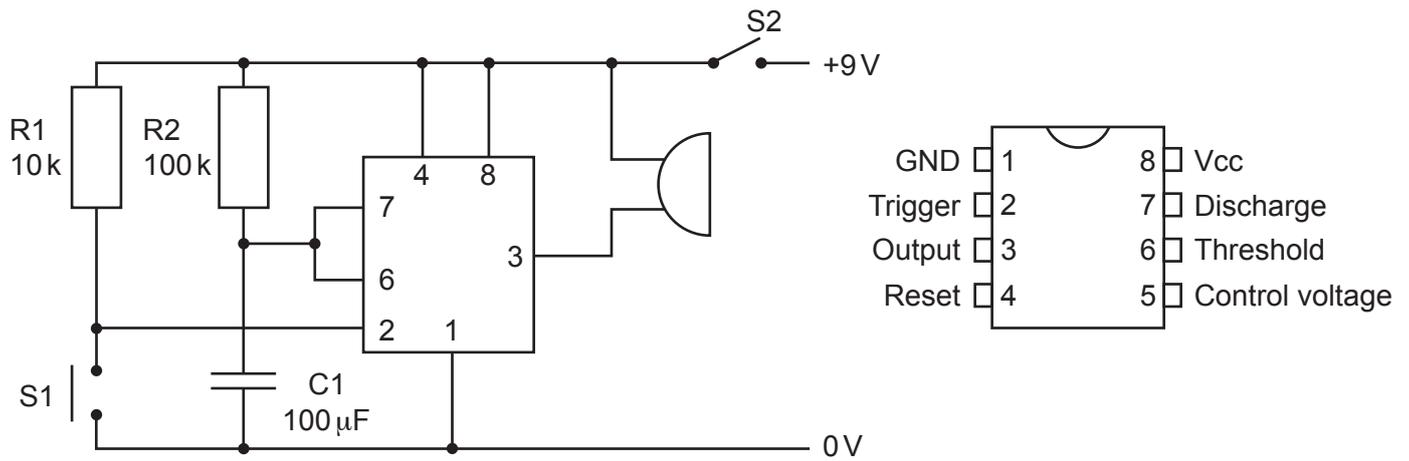


Fig. 5.1

- (i) Describe the operation of the circuit. [5]
- (ii) Calculate the time constant. [3]
- (b) Discuss the importance of innovation in the design of electronic products. [12]

6 (a) Use sketches and notes to describe an application of each of the following mechanisms in a product.

- cam
- crank
- ratchet

[12]

(b) Pneumatic and hydraulic systems are commonly used in vehicles. Give an example of how each system is used in a vehicle and explain why the system is suitable. [8]

Part C – Graphic Products

7 Fig. 7.1 shows details of a basket made from 2 mm card.

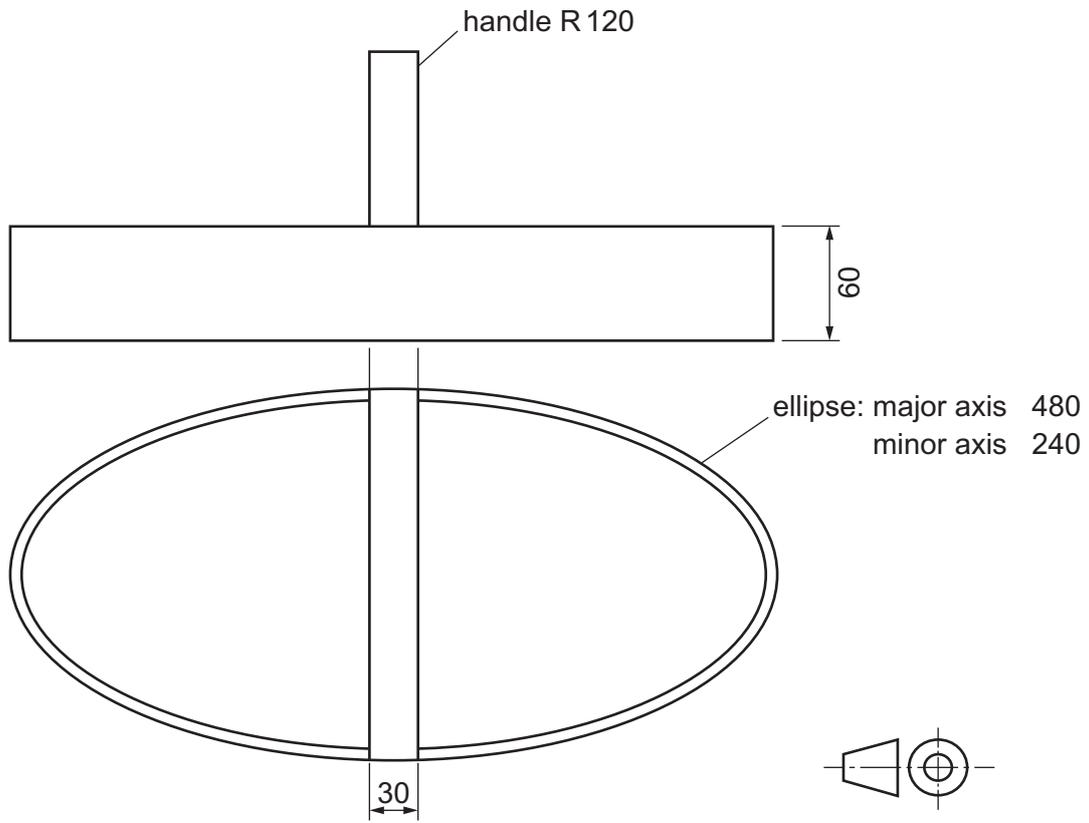


Fig. 7.1

Draw to a scale of 1:2 an isometric view of the basket.

[20]

- 8 Reprographics involves the reproduction of graphic images using electronic or mechanical methods.

Use sketches and notes to describe a method of reproducing graphic images:

- electronically
- mechanically.

For each, give details of a graphic product that would be produced by the method and explain why the method is particularly suitable. [20]

9 Fig. 9.1 shows packaging to protect delicate items.

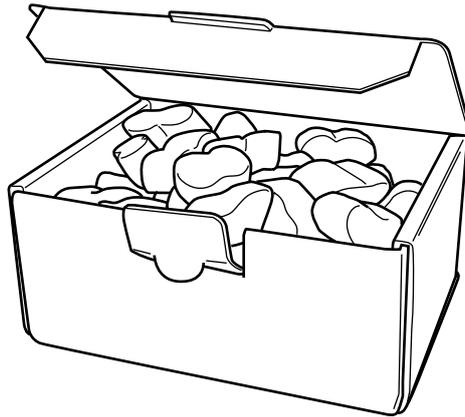


Fig. 9.1

(a) State a suitable material for:

- the box
- the foam chips.

[2]

(b) Use sketches and notes to describe how a batch of 5000 boxes could be produced.

[18]

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** The music department in a school has limited space for its students to practise playing their instruments.

You are to design a music stand that can be used on a school desk.

The music stand must:

- be able to hold sheet music up to a maximum of A3 in size
- be easy to store.

[80]

- 11** Ground staff at a school collect litter from around the school in bags.

You are to design a product that will hold a bag to enable the collection of litter and transport it around the school.

The product must:

- hold a bag measuring $\varnothing 500 \times 750$
- allow the bag to be easily removed.

[80]

- 12** A new art and graphics equipment supply company named Star+, wishes to extend its market by giving a free promotional gift to students who enrol on University Arts, Graphics and Design courses.

You are to design:

- a logo for the company Star+
- a promotional desk organiser to hold brushes, pens and assorted stationery equipment.

The desk organiser must:

- be 'flat pack' to allow for postage in a 324×458 sized envelope
- reflect the image of the company Star+.

[80]

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