



Cambridge International AS & A Level

DESIGN & TECHNOLOGY**9705/33**

Paper 3

October/November 2021**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. 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 a nutcracker and details of its component parts.

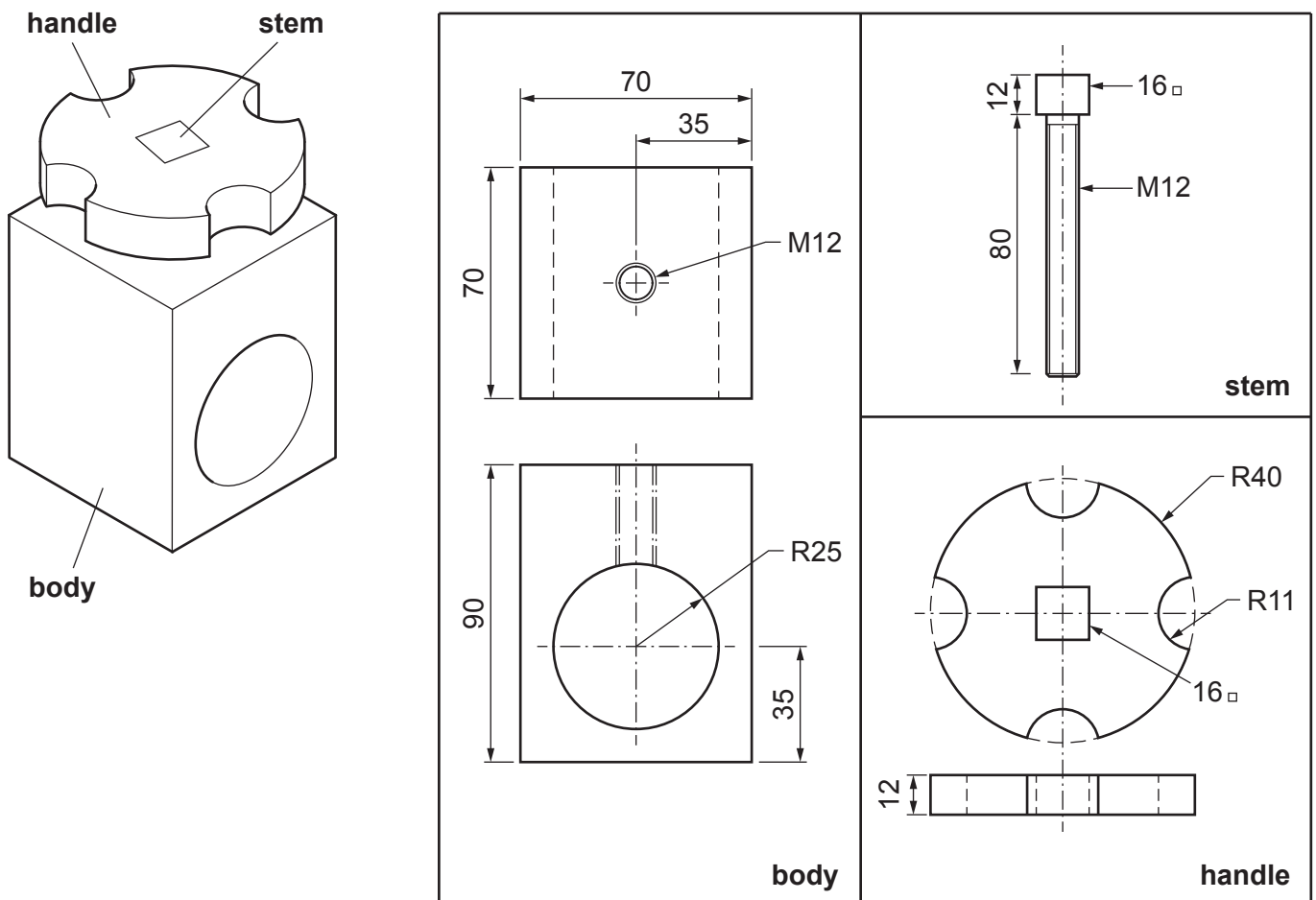


Fig. 1.1

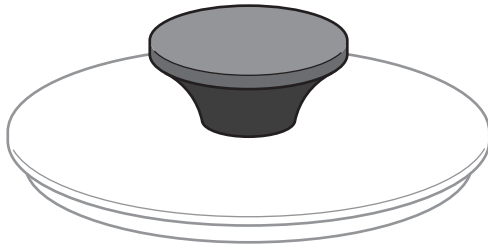
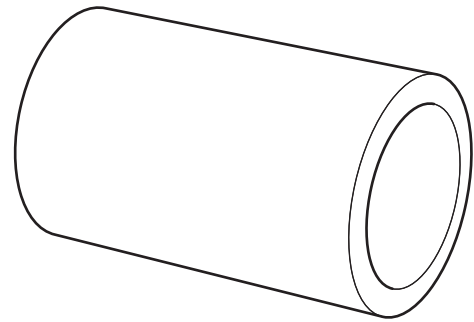
Select **one** of the three components body, stem or handle.

- (a) State a suitable material for the component you have selected and give **two** reasons for your choice. [3]
- (b) Describe, using sketches and notes, how you would make the component 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 1000 identical components were required. Use sketches and notes to support your answer. [8]

3

2

item: steel sleeve
process: case hardening



item: handle on pan lid
process: compression moulding

item: kitchen drawer side
process: profile forming

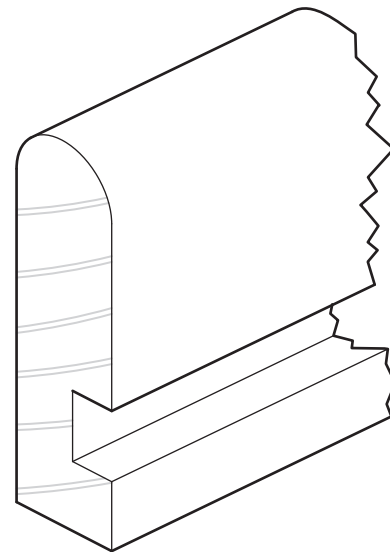


Fig. 2.1

Choose **two** of the items shown in Fig. 2.1. 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]

- 3 There is growing global concern over dwindling resources and the increasing wastage of materials. Discuss the implications to the manufacturer and consumer on society's efforts to address this problem. [20]

Part B – Practical Technology

4 Fig. 4.1 shows a frying pan.

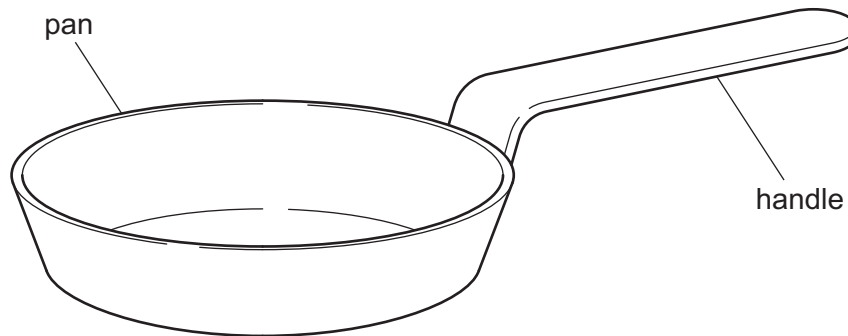


Fig. 4.1

(a) Describe, using sketches and notes, how the handle could be attached to the pan:

- (i) temporarily [5]
- (ii) permanently. [5]

(b) Compare and contrast, using sketches and notes, **two** methods of manufacturing a frying pan as a one-piece product. [10]

5 (a) Define the following properties relating to materials.

- plasticity
- toughness. [2]

(b) State **one** material that has the property of plasticity and **one** material that has the property of toughness. [2]

(c) Use sketches and notes to describe a method that could be carried out in a workshop to compare the toughness of different materials. [8]

(d) Explain what is meant by Young's Modulus of elasticity with reference to the design of products. [8]

6 Fig. 6.1 shows part of a control circuit.

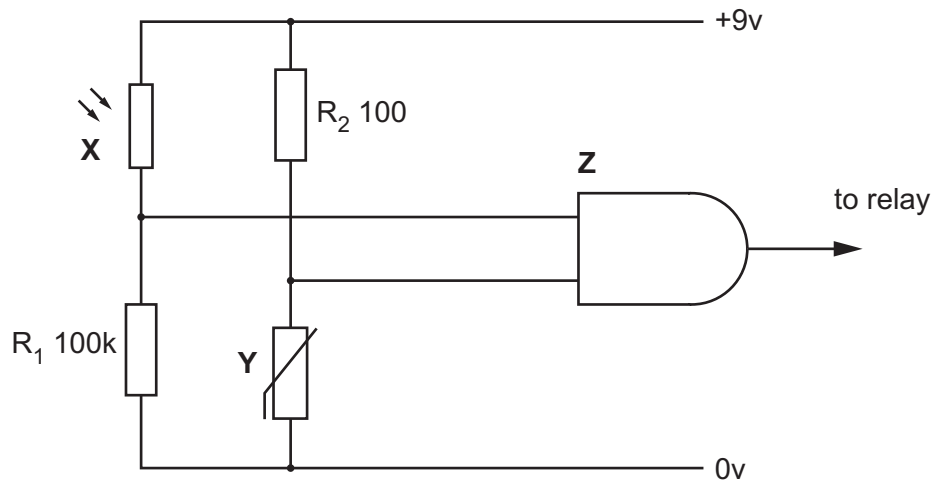


Fig. 6.1

- (a) (i) Name components **X** and **Y**. [2]
- (ii) Name component **Z** and draw a truth table for the component. [3]
- (iii) Describe how the circuit operates. [5]
- (b) Use sketches and notes to explain how twisting and buckling may cause structures to fail. [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 incomplete orthographic views of a cone and an intersecting sphere.

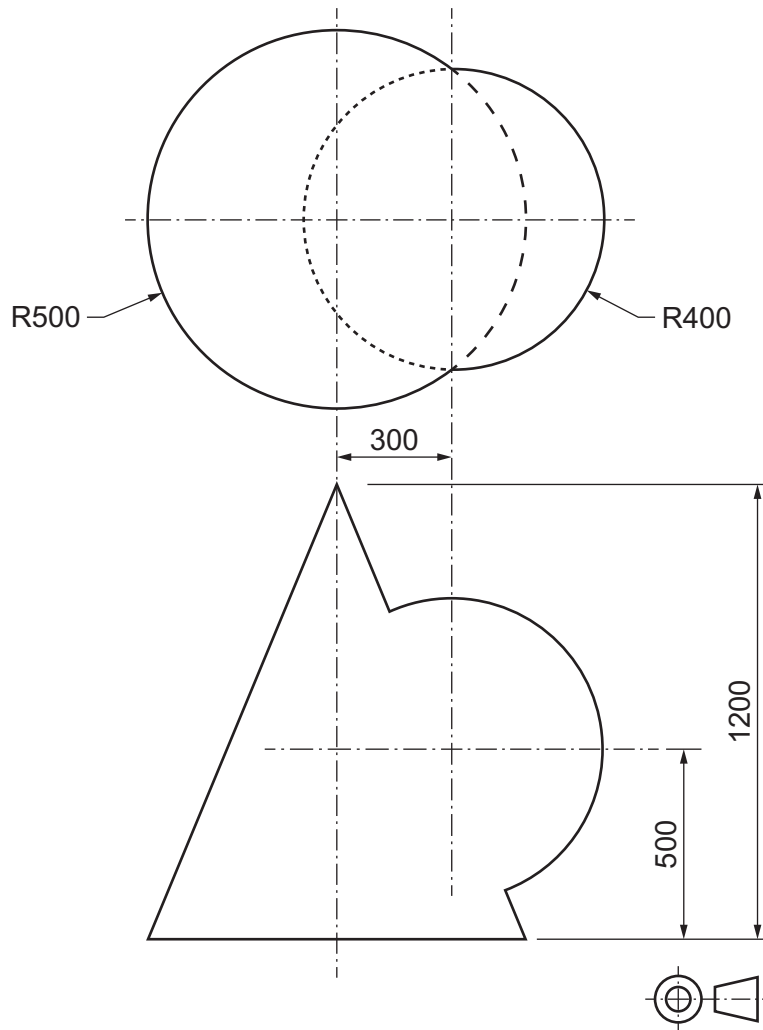


Fig. 7.1

Draw to a scale of 1: 10:

- (a) the given orthographic views, and complete the lines of intersection [14]
- (b) the development (net) of the cone including the cut out for the sphere. [6]

- 8 (a) Use **two** examples to demonstrate the influence of fashion and style on the design and manufacture of products. [6]
- (b) Describe **two** ways in which consumer research can be carried out by a company considering the development of a new product. [6]
- (c) Explain how the analysis of existing and older versions of products can be of use to a designer when designing a new product. [8]
- 9 Discuss the importance of packaging design with reference to:
- the consumer
 - the manufacturer. [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

Use bold sketches and notes to show 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 school for 4 to 5 year-old children requires new play equipment.

You are to design a rocking toy that a child can sit on.

The rocking toy must be:

- easily assembled and disassembled for storage
- able to be used indoors and outdoors.

[80]

11 A Design and Technology department has a number of magnifying glasses and wishes to use them when students are soldering components.

You are to design a product that will support the magnifying glass and provide light to the area worked on.

The product must:

- hold the magnifying glass at different angles and at heights up to a maximum of 300 mm above the work surface
- illuminate the working area when required.

Details of the magnifying glass are given in Fig. 11.1.

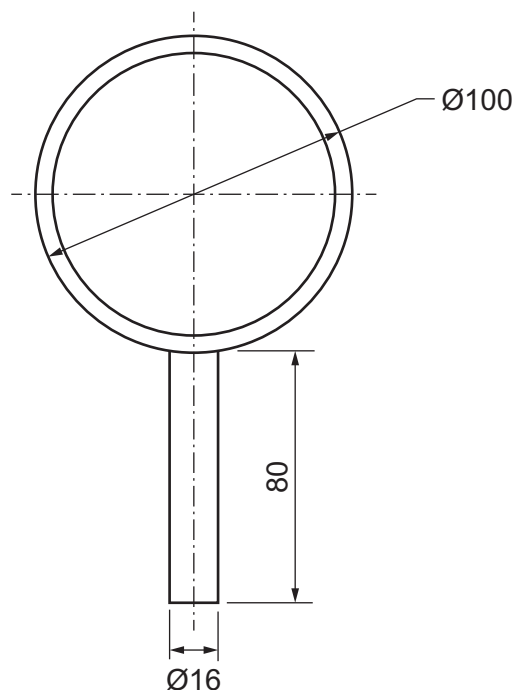


Fig. 11.1

[80]

12 A company wishes to introduce a new range of healthy biscuits for young children. The biscuits are to be based on the theme of outer space.

You are to design:

- an innovative new biscuit shape
- an exciting name for the new biscuit
- innovative packaging for up to 12 biscuits
- a promotional item to advertise the new biscuit brand.

[80]

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