

CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education  
Advanced Subsidiary Level and Advanced Level

**DESIGN AND TECHNOLOGY**

**9705/03**

Paper 3

May/June 2003

**2 hours 30 minutes**

Additional Materials: Answer paper  
A3 Drawing paper (5 sheets)  
A range of design drawing equipment

**READ THESE INSTRUCTIONS FIRST**

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

**Section A**

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

**Section B**

Answer **one** question.

Write your answers on the separate answer paper provided.

If you use more than one sheet of paper, fasten the sheets together.

The number of marks is given in brackets [ ] at the end of each question or part question.

All dimensions are in millimetres.

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.

Section A

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

Part A – Product Design

- 1 Use sketches and notes to describe **two** different methods of manufacturing a  $\text{Ø}30$  sphere. (The sphere may be either hollow or solid.)

For each method include details of the specific material used and methods used to ensure accuracy. [10 x 2]

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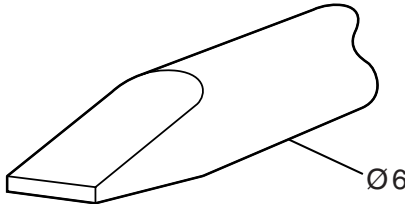
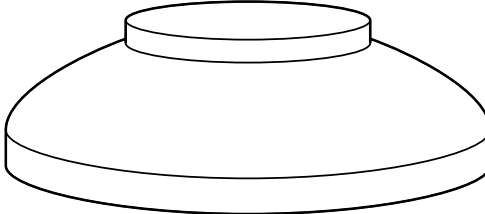

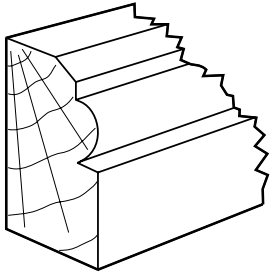
<p>High carbon steel screwdriver blade process: hardening and tempering</p>	
	<p>Plastic fan cover process: compression moulding</p>  <p>section through fan cover</p>
<p>Wood picture frame section process: moulding</p>	

Fig. 1

Choose **two** of the items shown in Fig. 1 and for each:

- (a) use sketches and notes to describe the process that relates to the chosen item; [7x2]
- (b) explain why the process is particularly suitable for the production of the item. [3 x 2]

- 3 Discuss how designers would take into consideration cultural and aesthetic needs when designing jewellery. Use illustrations and examples to support your answer. [20]

## Part B – Practical Technology

- 4 (a) Use examples to explain the difference between a natural and a manufactured structure. [1]
- (b) Use examples to explain the difference between a monocoque and a frame structure. [5]
- (c) Structures are subjected to many forces. Use **one** example for each of the following to describe the effect that forces have on, and how they are withstood by:
- (i) a natural structure;
- (ii) a manufactured structure. [10]
- 5 Increasing consumer awareness of environmental issues has led to a greater focus on the development of energy efficient products.
- (a) State how energy efficiency is calculated. [2]
- (b) (i) Identify **two** energy efficient domestic products or systems and describe the purpose of each. [4]
- (ii) Explain how the energy efficiency is achieved within the products or systems identified in part (i). [14]
- 6 Materials can be joined in many different ways.
- (a) Use notes and sketches to explain the differences between soft soldering and welding (electric or gas).
- Give **one** example of a suitable application of each method. [8]
- (b) Describe in detail the process of preparing surfaces and applying the following adhesives to make a successful joint.
- In each case, state appropriate materials to be joined.
- Epoxy resin
  - Polyvinyl Acetate (PVA)
  - Contact adhesive
- [12]

Part C – Graphic Products

7 Fig. 2 shows a design for a village hall.

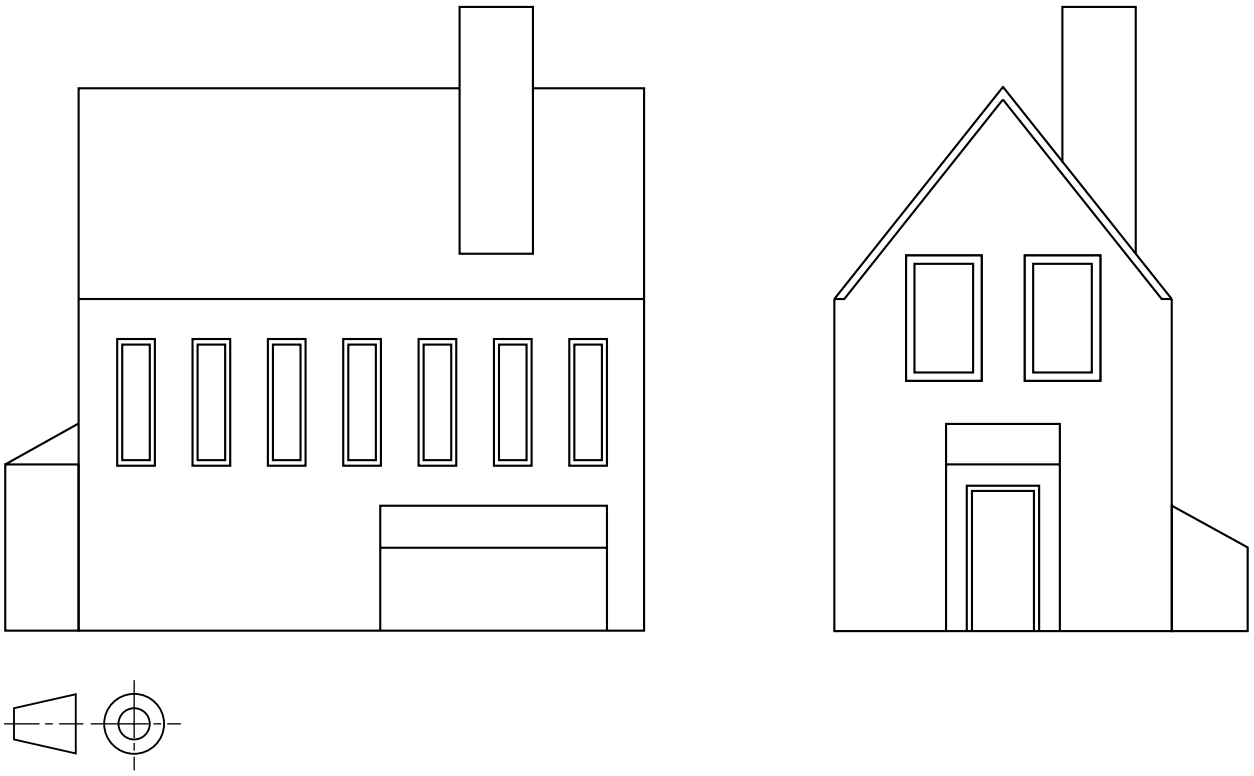


Fig. 2

Building contractors require a high quality presentation drawing to use on their promotional literature.

- (a) Draw, approximately twice full size, a presentation view of the village hall using estimated two point perspective. [14]
- (b) Render the walls, roof, windows and door to make the village hall look realistic. [6]

- 8 Discuss how computers have influenced the design and manufacture of products in the following areas:
- research;
  - working and presentation drawings;
  - stock control;
  - the control of production machines.
- [20]

9 Graphic methods are often used to present information in a clear and easily understood manner.

(a) Explain using an example:

- (i) a pictogram;
- (ii) a flow chart.

[6]

(b) Fig. 3 shows a full size isometric view of a bracket.

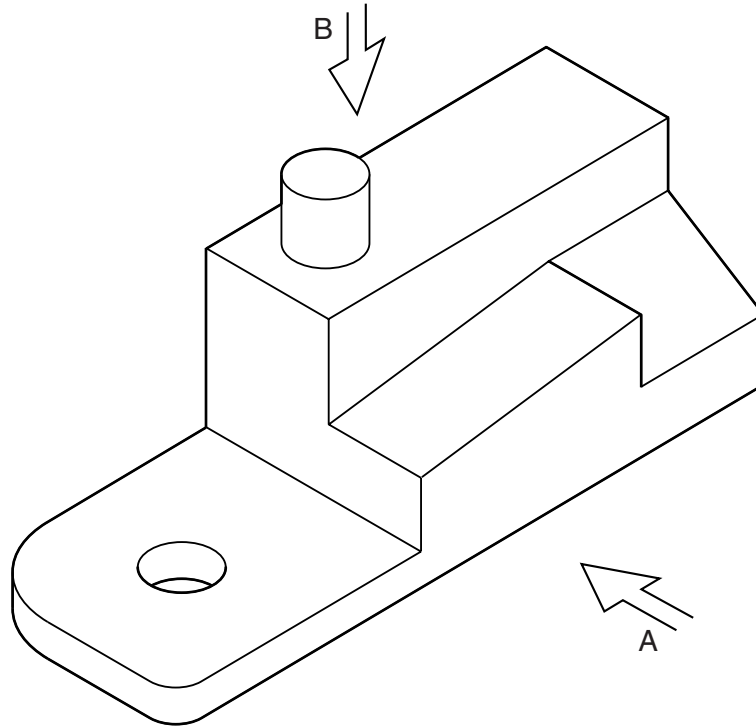


Fig. 3

- (i) Draw views A and B twice full size in orthographic projection. [6]
- (ii) Take approximate measurements from Fig. 3 to fully dimension the drawings. [6]
- (iii) Indicate the angle of projection. [2]

**Section B**

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

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. [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]

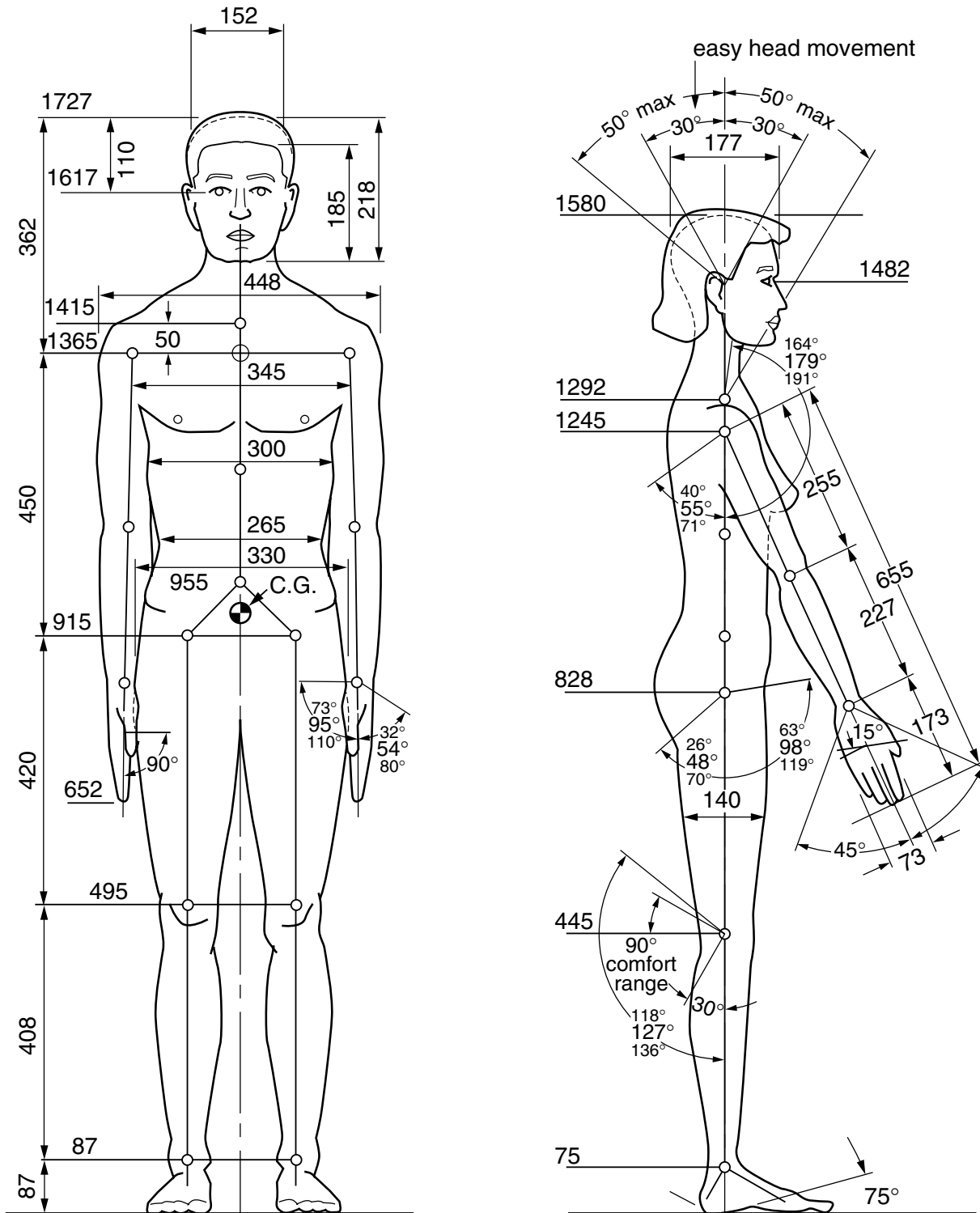
[Total : 80]

10 A popular pastime at sunny holiday resorts is to relax on the beach, either sunbathing

Design a product that is capable of:

- safely and comfortably supporting an adult when reading or sunbathing;
- being adjusted to a range of positions from a reclining position to an upright reading position;
- being easily carried to and from the boot of a car to the beach.

To assist you in your design work, anthropometric data is given in Fig. 4



11 Money boxes, to collect for charities, are more likely to attract attention and use if they give a response when a coin is deposited.

A money box is to be situated in the entrance hall of a school.

You are to design a mechanical/electronic system which is activated by inserting a coin. It is to be attached to the money box shown in Fig. 5.

The system must:

- react to the insertion of a coin by having a mechanical movement;
- use either lights or noise to amuse the donor;
- attach securely to the money box.

Details of the construction of the money box are not required

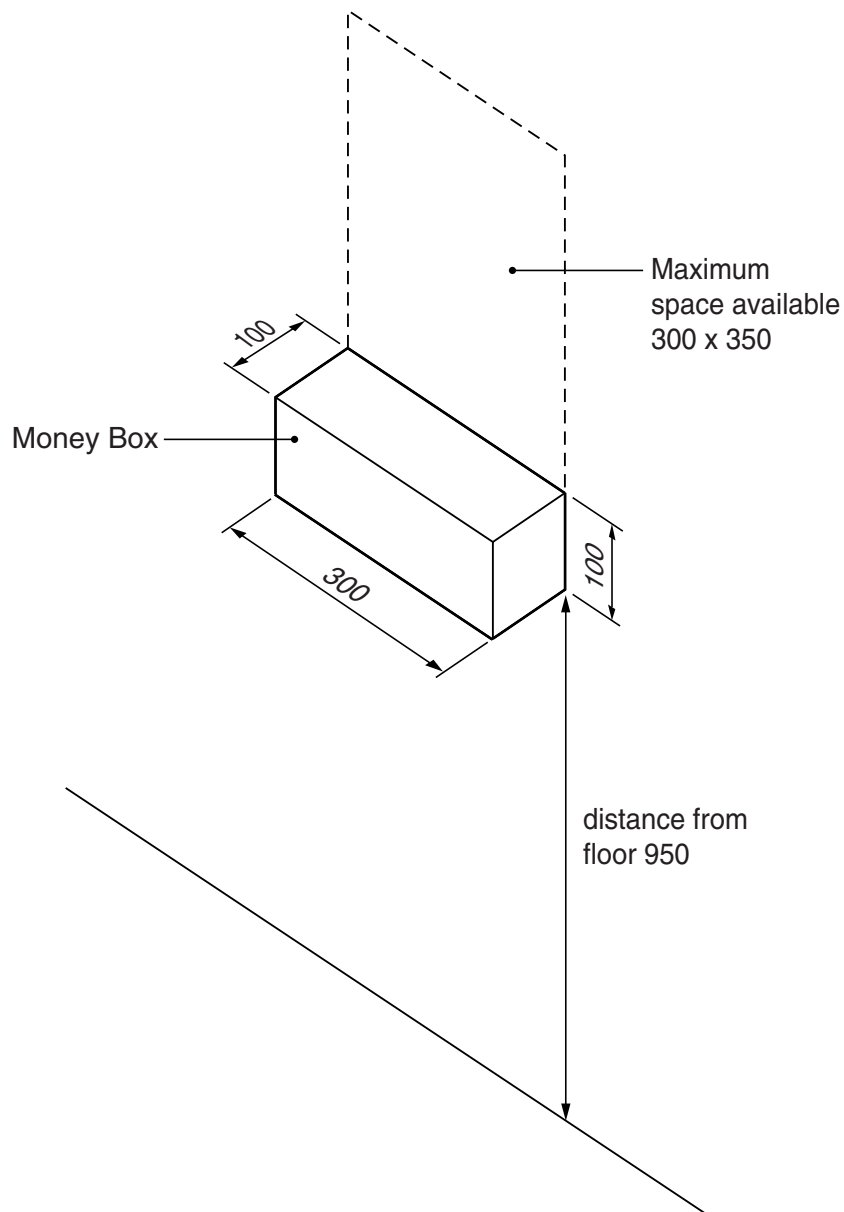


Fig. 5



12 A company wishes to promote a new range of fruit drinks. The drinks are designed and will come in three flavours:

- Annie Apple
- Laurie Lemon
- Oliver Orange

The company will promote the drinks by offering a pack of three ceramic mugs at a special price.

You are to design the following:

- a cartoon style character for **one** of the flavours. It is to be printed on the space indicated on the mug shown in Fig. 6;
- an easy to carry card package to hold and protect three mugs. Include full details of nets/developments;
- an appropriate lettering style for the flavour of your choice should be seen clearly on the packaging.

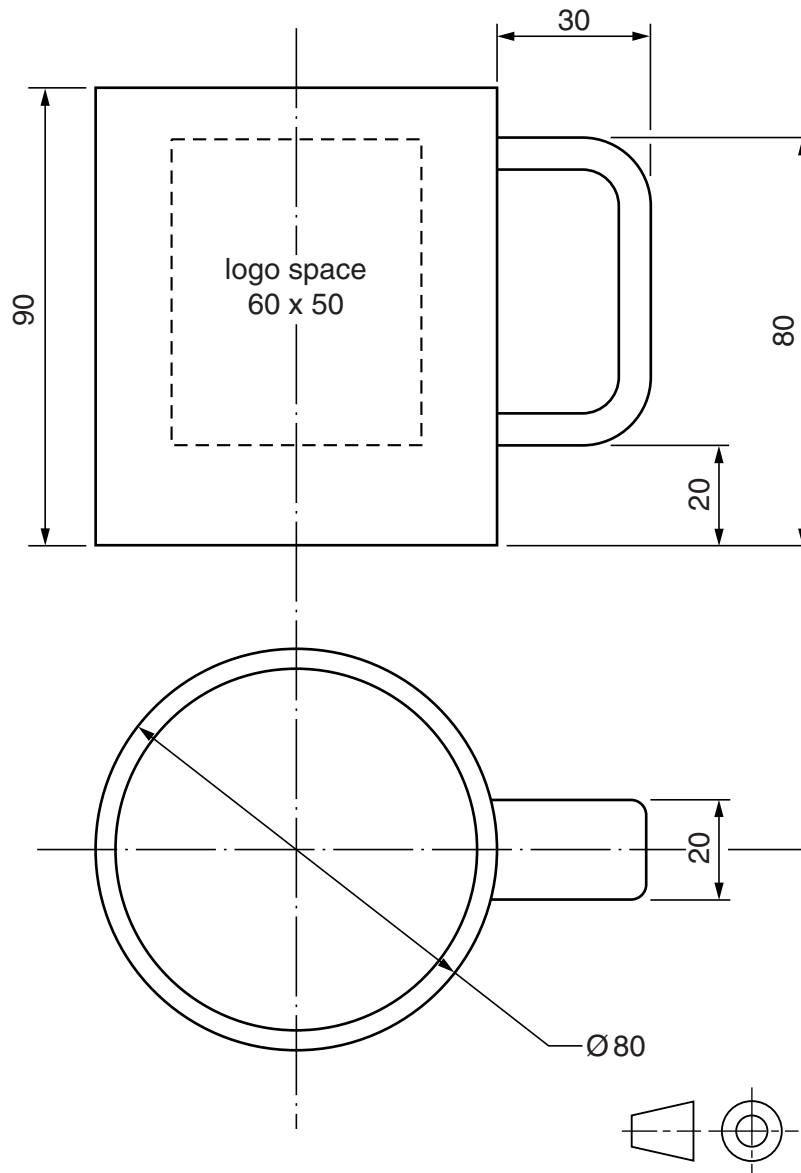


Fig. 6



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