

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

**DESIGN AND TECHNOLOGY**

**9705/01**

Paper 1

October/November 2005

**2 hours 30 minutes**

Additional Materials: Answer Booklet/Paper

**READ THESE INSTRUCTIONS FIRST**

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet. Write your answers and working on the separate Answer Booklet/Paper provided. Write your name, Centre number and candidate number on all the work you hand in. Write in dark blue or black pen on both sides of the paper. You may use a soft pencil for any diagrams, graphs or rough working. Do not use staples, paper clips, highlighters, glue or correction fluid.

**Section A**

Answer **all** questions.

**Section B**

Answer any **two** questions.

**Section C**

Answer any **two** questions.

At the end of the examination, fasten all your work securely 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.

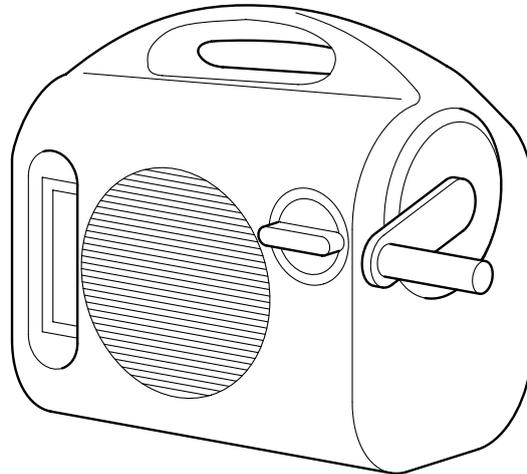
This document consists of **11** printed pages and **1** blank page.



**Section A**

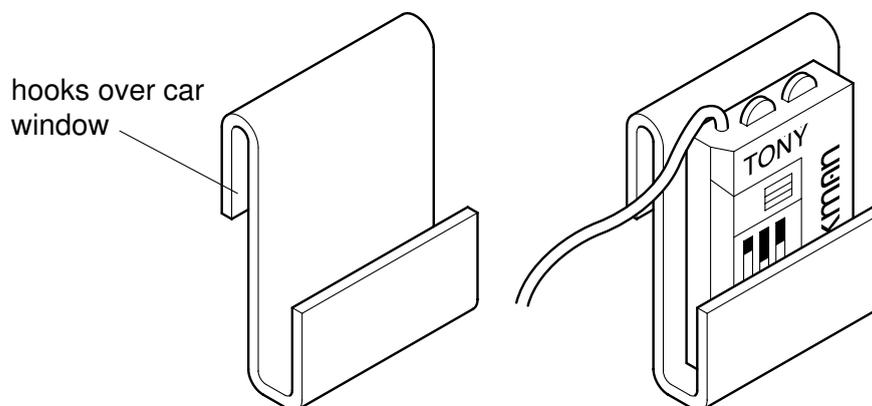
Answer **all** questions.

- 1 Fig. 1 shows a radio, powered by clockwork, which is to be used by people living in remote parts of the world.



**Fig. 1**

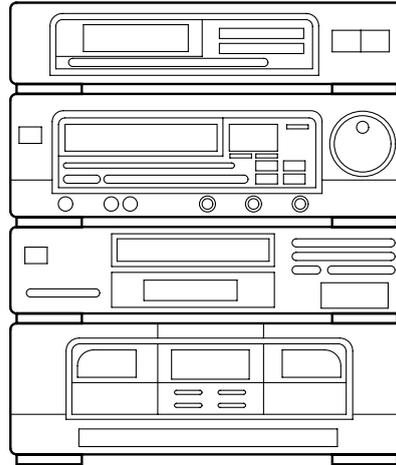
- (a) State the type of energy that clockwork would have to be converted to in order to make the radio work. [1]
- (b) Explain **two** reasons why clockwork is a good energy source for a radio which is to be used in remote parts of the world. [4]
- (c) Name **two** other sources of energy that could be used to power a radio. [2]
- 2 Passengers travelling in the back of cars often listen to a personal stereo. Fig. 2 shows a design for a device which hooks over a car window and holds a personal stereo.



**Fig. 2**

List **six** factors related to size, safety and ease of use that could form part of the design specification for the storage device. [6]

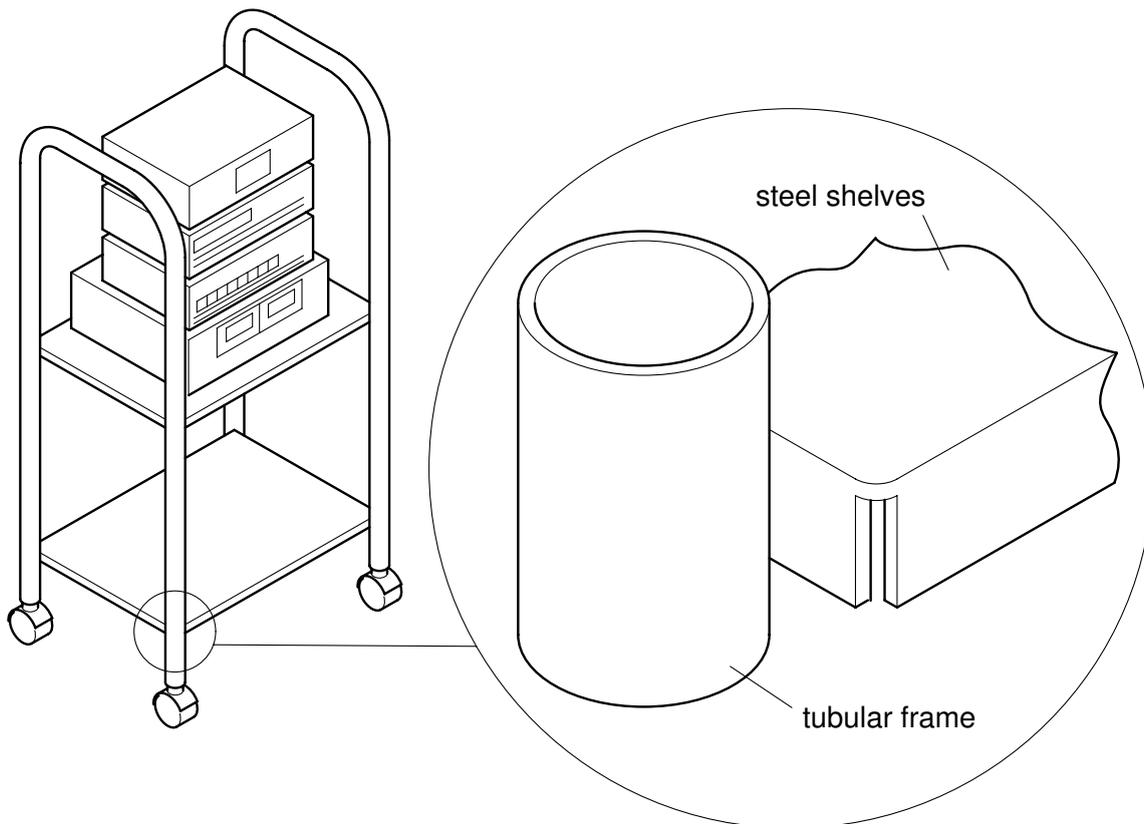
- 3 Several parts of the hi-fi system shown in Fig. 3 have been mass produced using the injection moulding process.



**Fig. 3**

- (a) Explain **two** reasons why products produced by injection moulding are generally of high quality. [4]
- (b) Explain **two** reasons why injection moulding is unlikely to be used for short production runs. [4]

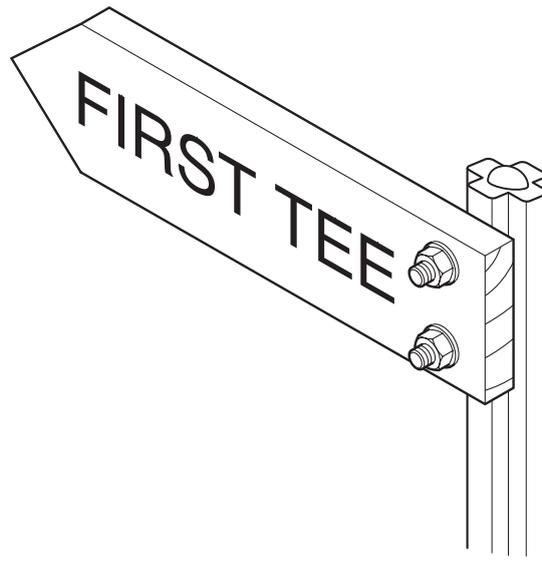
- 4 Fig. 4 shows a hi-fi trolley. It consists of tubular frames and steel shelves which are designed for easy home assembly.



**Fig. 4**

- (a) Explain **two** reasons why many people prefer to buy home-assembly furniture rather than ready assembled furniture. [4]
- (b) Sketch a component which could be used to join the tubular frame of the trolley to the steel shelves. [5]

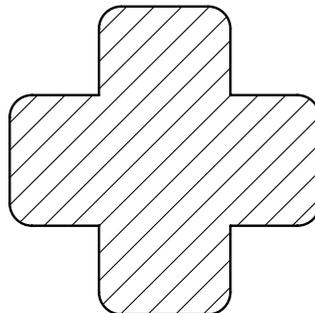
- 5 A number of direction signs of the type shown in Fig. 5 are required for a golf course. The signs are made from natural untreated wood.



**Fig. 5**

- (a) State the name of a specific wood that could be used and explain why it would be suitable for use in this situation. [2]
- (b) Fig. 6 shows a cross-sectional view of the post for the sign.

Use sketches and notes to describe the tools and processes that would be used to produce a 1500 mm long post of this shape. [4]



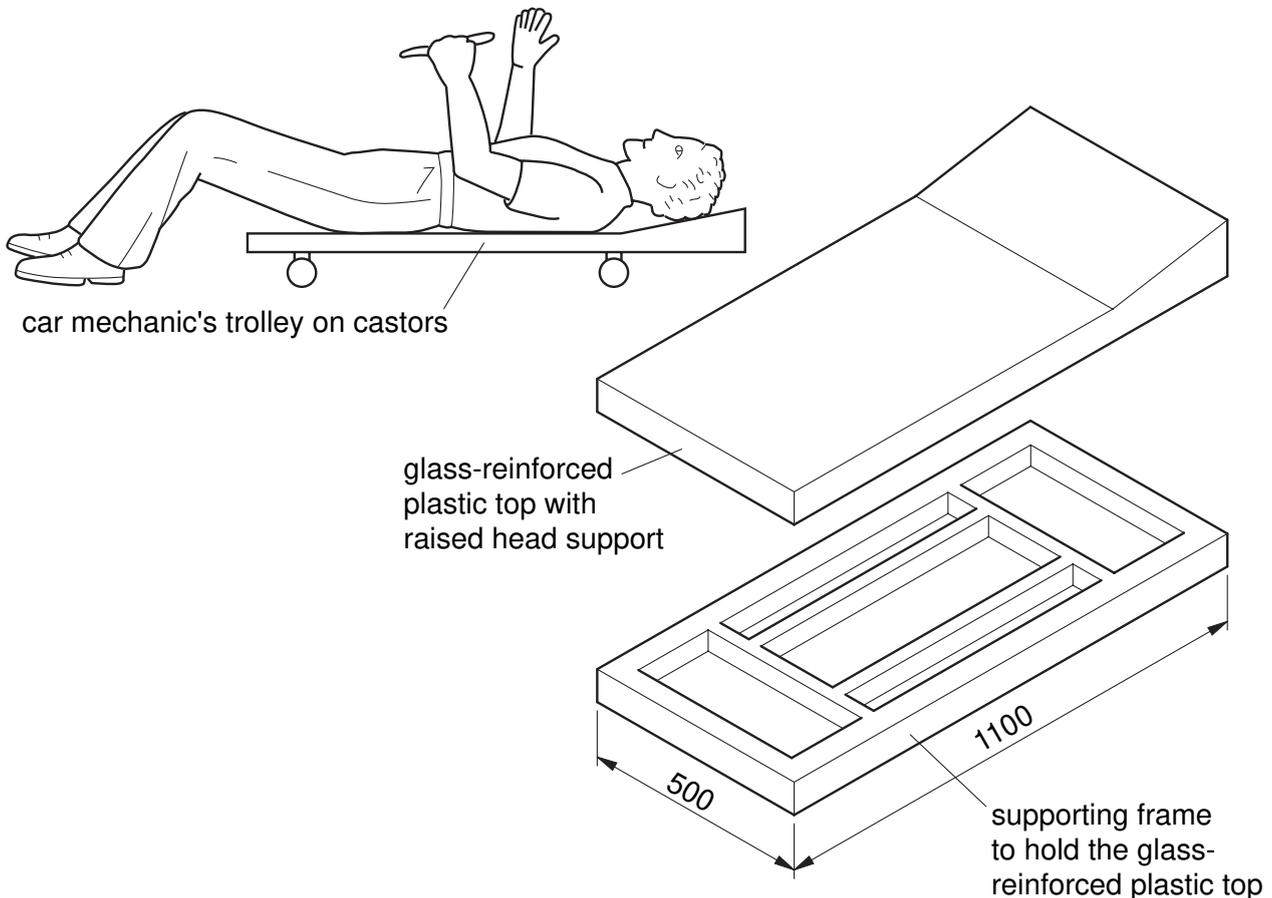
**Fig. 6**

- (c) Describe how CAD (computer aided design) and CAM (computer aided manufacture) could be used in the designing and cutting of the letters into the face of the sign. [4]

**Section B**

Answer **two** questions from this section.

- 6 Fig. 7 shows a car mechanic's trolley on castors. This is used when a person is working underneath a car. The top of the trolley is made from glass-reinforced plastic and the support frame is made from metal.



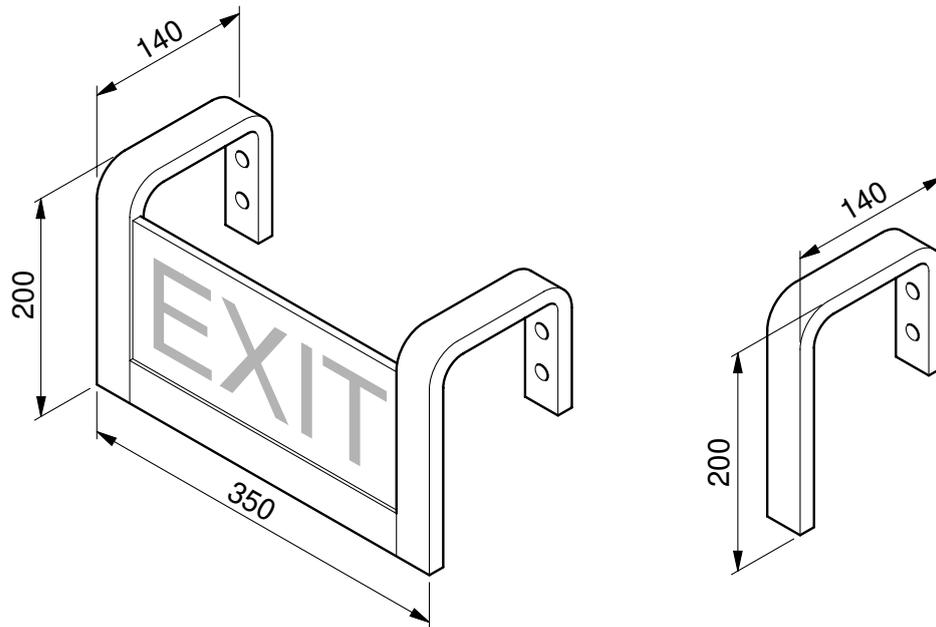
**Fig. 7**

- (a) Specify a suitable metal for the frame of the trolley and explain **two** reasons for your choice. [3]
- (b) Use sketches and notes to describe:
- (i) how the metal would be marked to length; [5]
  - (ii) how the metal would be cut and finished to the correct lengths; [5]
  - (iii) how the metal would be joined together. [5]

You must give details about the tools, equipment and processes involved and the safety precautions that have to be undertaken at each stage.

- (c) Specify a suitable surface finish for the metal and explain **one** reason for your choice. [2]

- 7 Fig. 8 shows a wall-mounted exit sign to be used in an airport departure lounge. The frame is made from wood and the sign from plastic.

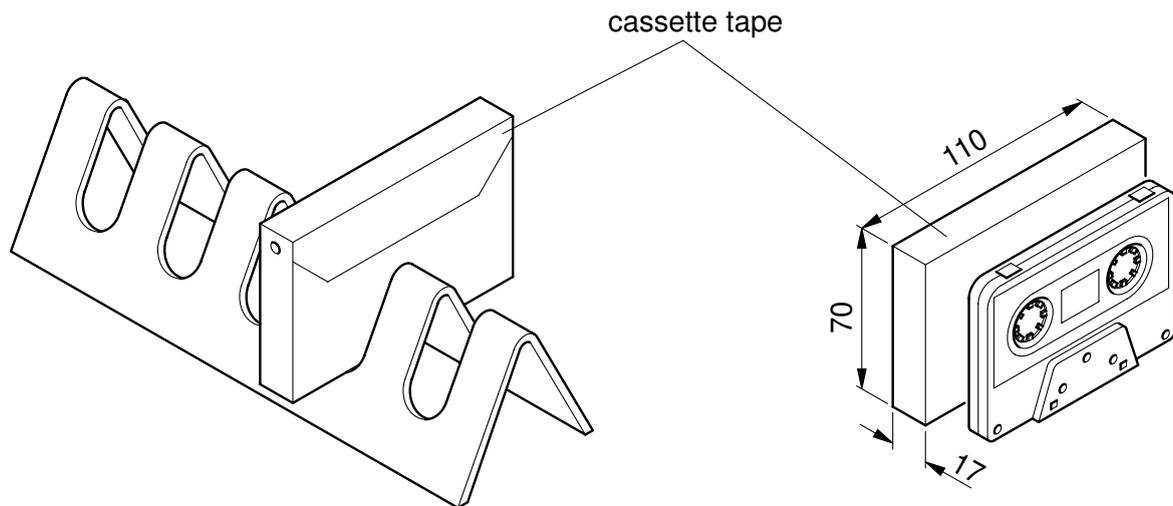


**Fig. 8**

- (a) Specify a suitable wood for the frame and explain **two** reasons for your choice. [3]
- (b) Specify a suitable plastic for the sign and explain **one** reason for your choice. [2]
- (c) Use sketches and notes to describe:
- (i) how the end supports could be formed to the required shape; [5]
  - (ii) how the three pieces of the frame would be joined together; [5]
  - (iii) how the plastic sign would be attached to the frame. [5]

You must give details about the tools, equipment and processes involved and the safety precautions that have to be undertaken at each stage.

8 Fig. 9 shows a design for a cassette tape storage rack.



**Fig. 9**

- (a) Draw, approximately full size, the shape, including the slots, that would need to be marked out on a flat sheet of plastic to make the cassette tape storage rack. [4]
- (b) State the name of a specific plastic that could be used to make the storage rack. [1]
- (c) Explain **three** advantages of using plastic rather than wood to make the storage rack. [3]
- (d) Making the storage rack includes the use of a drilling machine and a strip heater. For **each** of these pieces of equipment:
- (i) state the process that it would be used for and use sketches and notes to describe the process; [8]
  - (ii) explain **two** safety points to be observed when using it. [4]

Section C

Answer **two** questions from this section.

- 9 Fig. 10 shows a combined corkscrew and bottle opener.

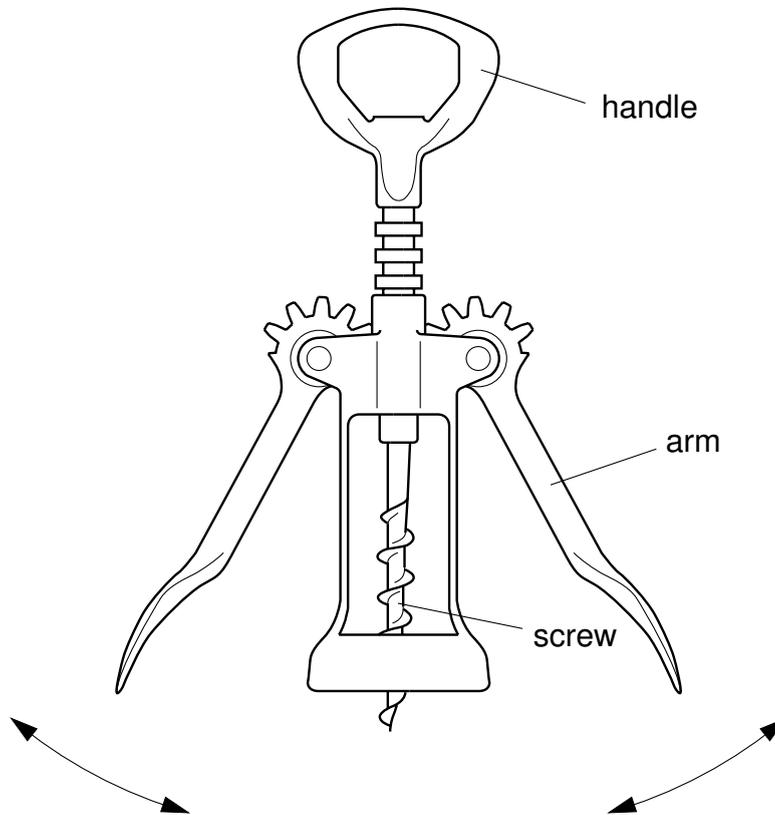


Fig. 10

- (a) The product uses three types of motion during the process of removing cork:

**rotary**

**oscillating**

**linear**

- (i) Identify the part(s) of the product where each type of motion occurs. [3]
- (ii) Use sketches and notes to explain how each type of motion is produced and the effects that this has on the cork. [9]
- (b) (i) Name the type of mechanism which links the handle and arms together. [2]
- (ii) Use a sketch and notes to describe how the mechanism identified in part (b)(i) works. [3]
- (c) Discuss potential hazards when using and storing the combined corkscrew and bottle opener. [3]

10 Fig. 11 shows three types of outdoor chair.

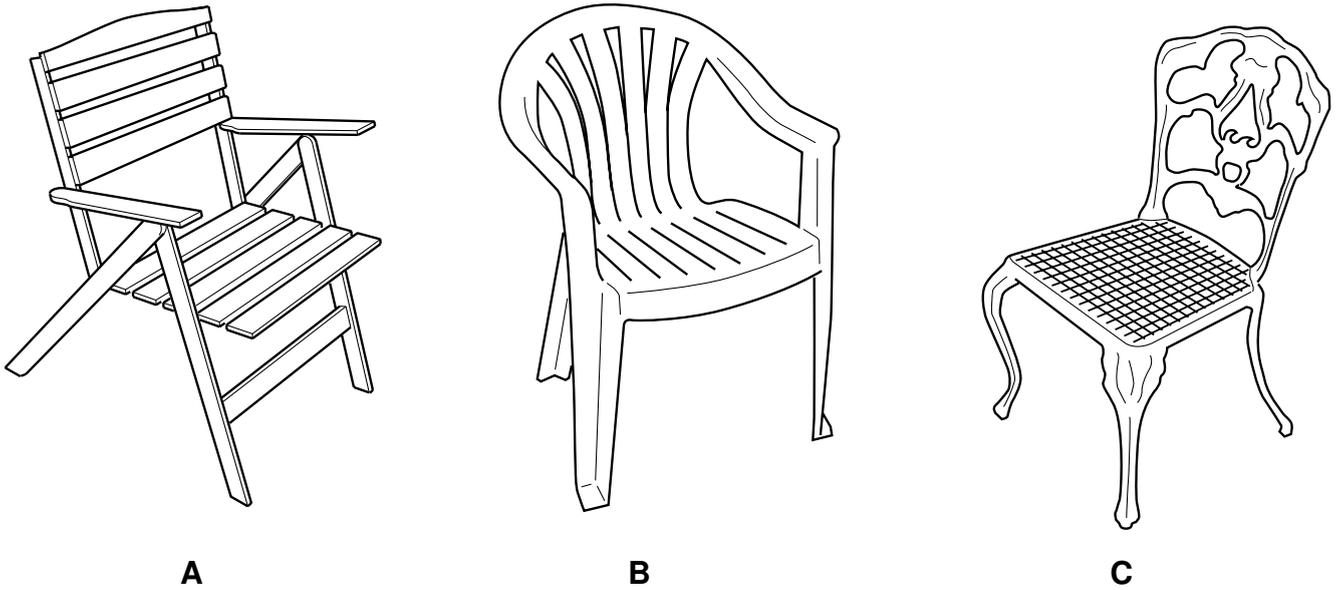


Fig. 11

(a) Name:

- (i) a softwood suitable for making chair **A**; [1]
- (ii) a thermoplastic suitable for making chair **B**; [1]
- (iii) a non-ferrous metal suitable for making chair **C**. [1]

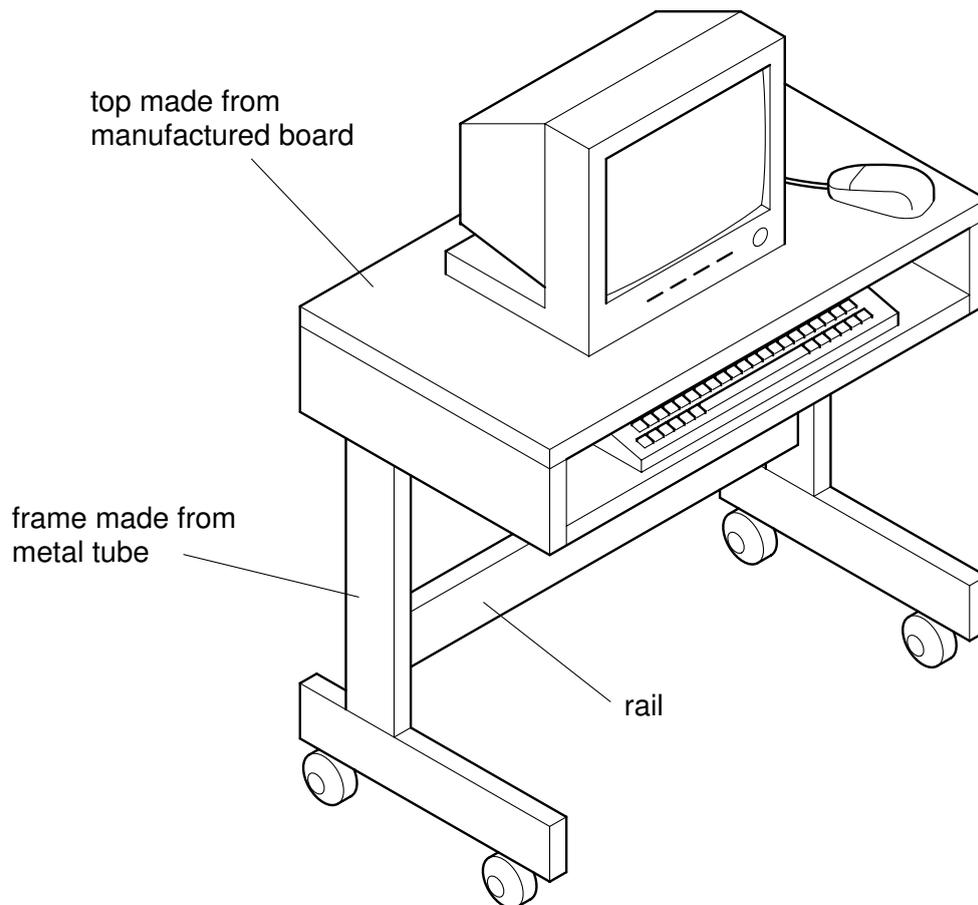
(b) Explain what is meant by each of the following terms:

- (i) fabricated; [2]
- (ii) injection moulded; [2]
- (iii) cast. [2]

(c) Explain why chair **A** might be considered more 'environmentally friendly' than chairs **B** and **C**. [2]

(d) Discuss, with relation to storage and maintenance, the advantages and disadvantages of the three chairs. [9]

- 11 Fig. 12 shows a computer workstation. It is to be sold as a low-cost flat-pack, self-assembly product.



**Fig. 12**

- (a) Name:
- (i) a suitable manufactured board for the top and a surface finish that could be applied to it; [2]
  - (ii) a suitable metal for the frame and a surface finish that could be applied to it. [2]
- (b) Explain why manufactured board is a more stable material to use for the top rather than solid wood. [2]
- (c) Explain why tubing has been used for the frame rather than solid bar. [2]
- (d) Explain **two** advantages to the manufacturer of producing furniture in flat pack form rather than ready assembled. [4]
- (e) Explain why most of the computer workstation would be joined together using temporary rather than permanent fixings. [2]
- (f) Discuss, with the aid of diagrams, the ergonomic factors that the designer would have needed to consider when designing the computer workstation. [6]

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