

DESIGN AND TECHNOLOGY

9705/32

Paper 3

October/November 2017

3 hours

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

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Section A

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

Section B

Answer **one** 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.

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.

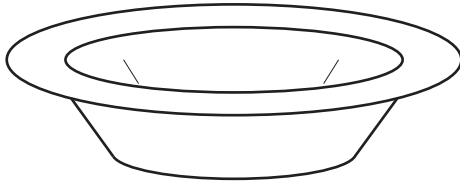
This document consists of **10** printed pages and **2** blank pages.

Section A

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

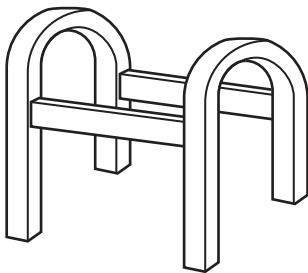
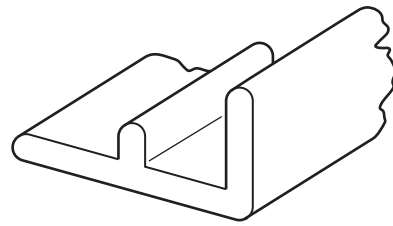
Part A – Product Design

1



item: aluminium bowl
process: annealing

item: PVC door runner section
process: extrusion



item: ash legs and rails
process: making a mortise and tenon joint

Fig. 1

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

- (a) use notes and sketches 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]

2 Fig. 2 shows a planter with details of the trough and one of the feet.

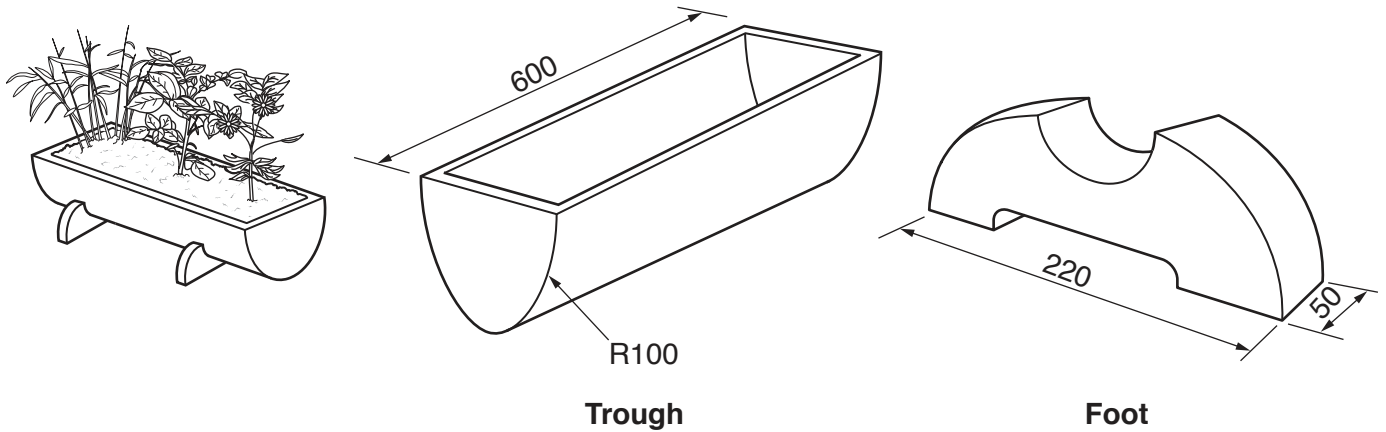


Fig. 2

(a) Choose **either** the trough **or** the foot shown in Fig. 2.

State a suitable material for your chosen part **and** give **two** reasons for your choice. [3]

(b) Describe, using notes and sketches, how you would make the chosen part. [9]

(c) Explain what changes may be necessary to the design, the manufacturing method used and the material selected if 100 of the chosen part were required. Use notes and sketches to support your answer. [8]

3 The selection of a finish is very important to the success of a product.

Choose **two** of the following:

- plastic dip coating
- anodising
- varnishing

For each describe in detail:

(a) a product, stating specific materials, **and** give a reason why the finish is appropriate; [6]

(b) the preparation and application of the finish. [14]

Part B – Practical Technology

4 Fig. 3 shows a claw hammer and nail.

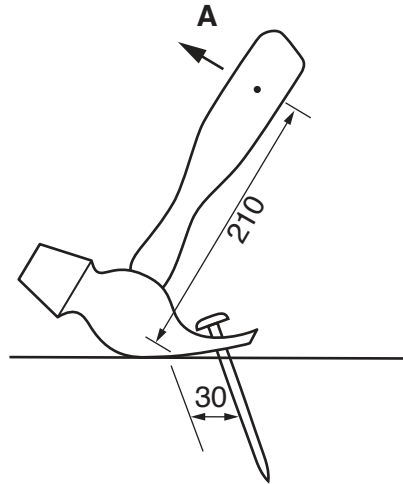


Fig. 3

- (a) The nail offers a resistance of 350 N. Calculate the force that must be applied to the hammer at **A** to remove the nail. [2]
- (b) Fig. 4 shows a stress/strain graph for three different metals: aluminium alloy, cast iron and mild steel.

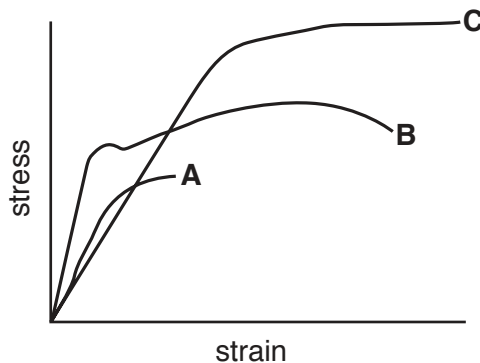


Fig. 4

- (i) Identify the metals that give the stress/strain profile at **A**, **B** and **C** and for each, give a reason for your choice. [6]
- (ii) Identify and describe the following features on the profile of metal **B**.
- fracture point
 - ultimate strength
 - elastic limit

For each, explain their relevance to the design of products. [6]

(c) Explain how designers take into account the following, when designing products.

(i) wear of components

(ii) corrosion [6]

5 Select **five** materials from the following:

medium density fibreboard

phenol formaldehyde

zinc

HDPE

bronze

polystyrene

copper

stainless steel

polyurethane

teak

(a) Name a specific product made predominantly from each of your selected materials. [5]

(b) For each of the products you have selected in part (a), explain in detail why the material used is particularly suitable. [15]

6 (a) Describe **two** applications of CAM (Computer Aided Manufacture) that can be used in a school workshop. [4]

(b) Explain in detail the benefits of CAM (Computer Aided Manufacture) in industry to:

(i) the manufacturer; [8]

(ii) the customer. [8]

Part C – Graphic Products

7 Fig. 5 shows the plan of a bathroom.

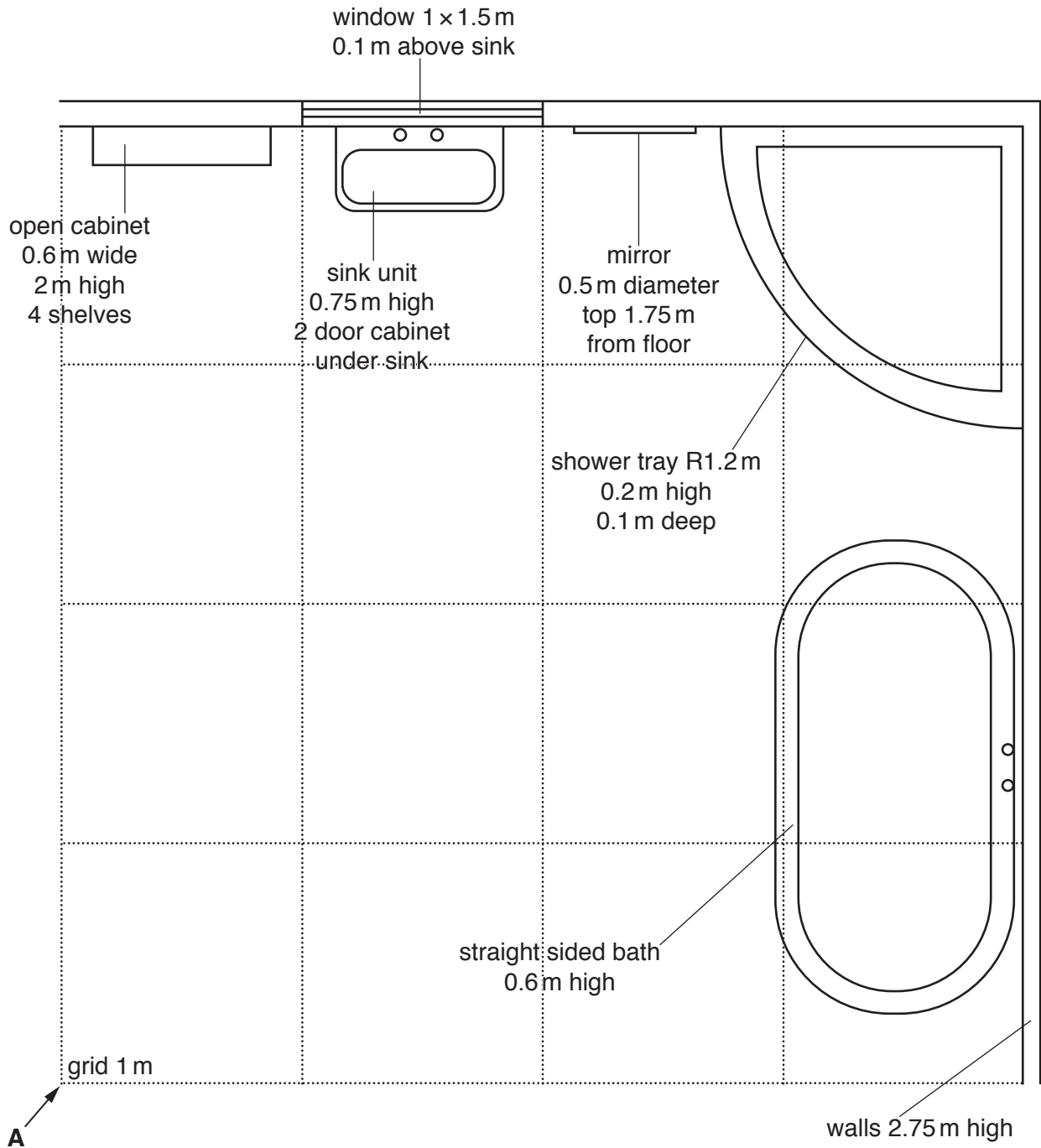


Fig. 5

Draw, to an approximate scale, a planometric drawing of the bathroom viewed from arrow **A**. [20]

8 Fig. 6 shows an isometric drawing of a bracket.

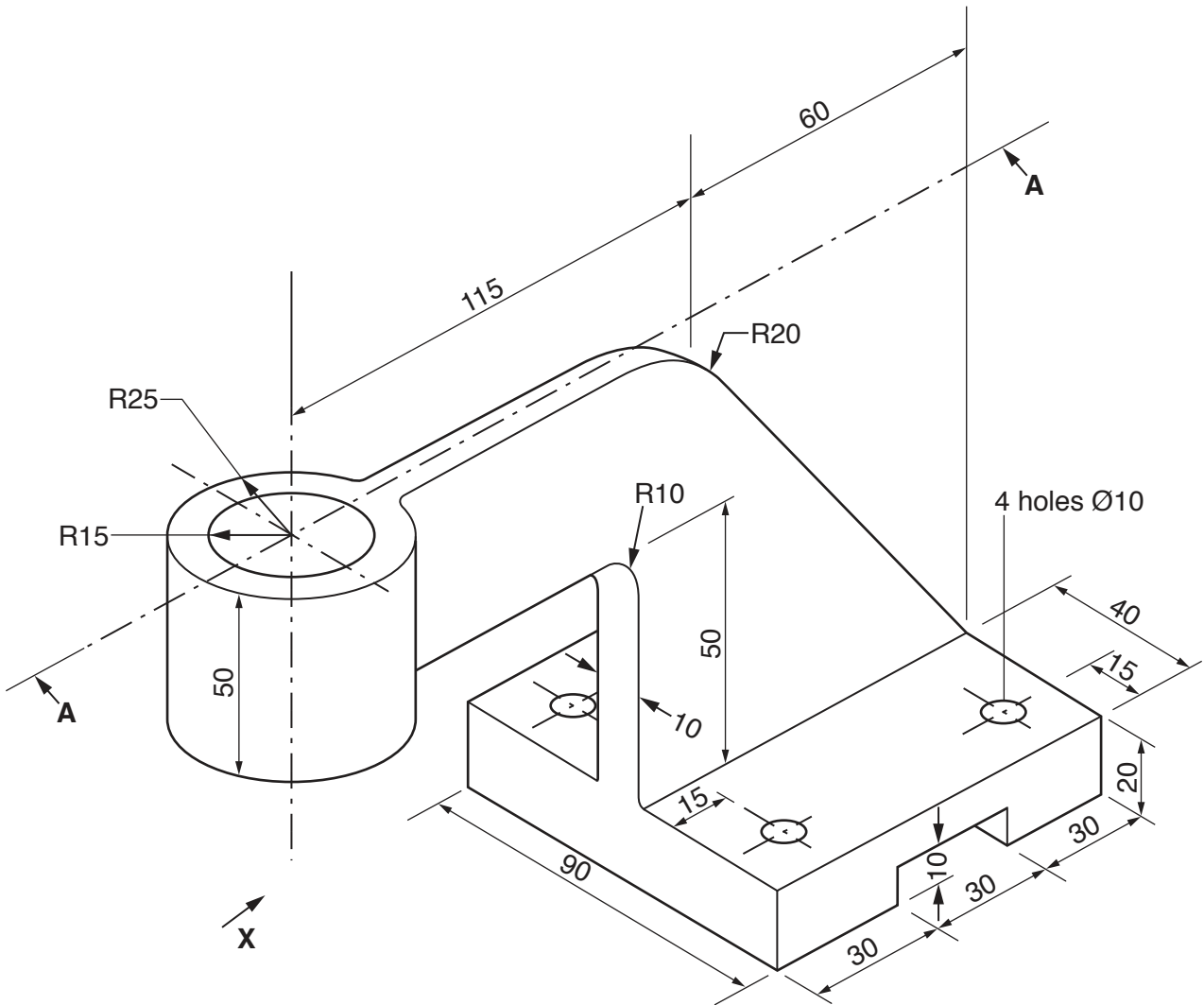


Fig. 6

(a) Draw full size in orthographic projection:

- a front elevation viewed from arrow **X**;
- a plan;
- a sectional elevation on **AA**.

[16]

(b) Add four main dimensions and include the symbol of projection.

[4]

9 There is increasing awareness of the importance of exercise in the health and well-being of young people and adults.

A multi-national company wishes to introduce a range of fitness tracker bands that are worn on the wrist and monitor distances walked or run, calories used and other useful energy related data.

Discuss the role of marketing in helping to ensure the commercial success of these new products.

[20]

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. 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]

Total: [80]

- 10** A design and technology department wishes to generate funds by building a simple device to launch a weighted fabric bag to knock down cans. Customers pay to launch 3 bags and may win a prize if they knock down all of the cans.

Design a product that can launch a weighted fabric bag.

The product must:

- be easily adjusted for angle and distance;
- be easy to operate.

Fig. 7 shows details of the siting of the cans and launching device and a weighted fabric bag.

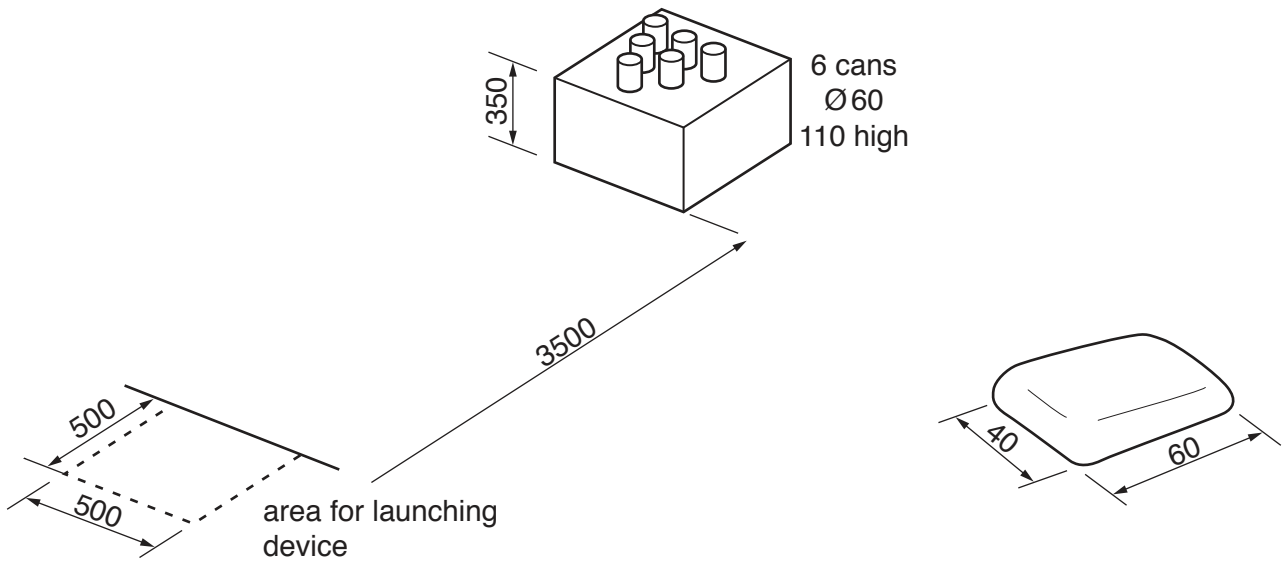


Fig. 7

- 11** The teaching of structures and mechanisms can be made more interesting when school students have the opportunity to construct structural or mechanical models and test them.

Design a kit which could be used by school students to assemble and test mechanisms or structures.

The kit must:

- enable school students to assemble and disassemble a range of models (structural or mechanical);
- be stored so that parts can be easily identified and checked.

- 12 A chain of restaurants wishes to introduce a product that can be placed in the centre of a dining table to hold items used by customers when dining.

Design a product that can hold containers for sauces, relishes and menus.

The product must:

- be produced as a flat pack;
- hold four ceramic containers;
- hold six A5 card menus;
- be easy to transport.

Details of a container are shown in Fig. 8.

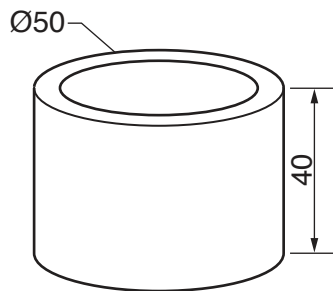


Fig. 8

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