



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Advanced Level

**DESIGN AND TECHNOLOGY**

**9705/32**

Paper 3

**October/November 2013**

**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 a soft pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.  
**DO NOT WRITE IN ANY BARCODES.**

**Section A**

Answer **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 **9** printed pages and **3** blank pages.

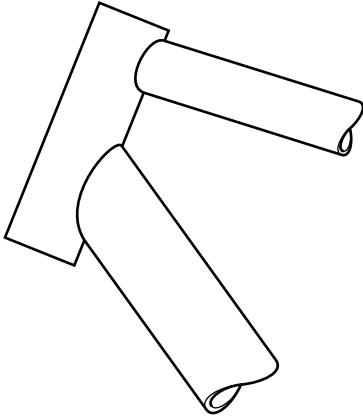


## Section A

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

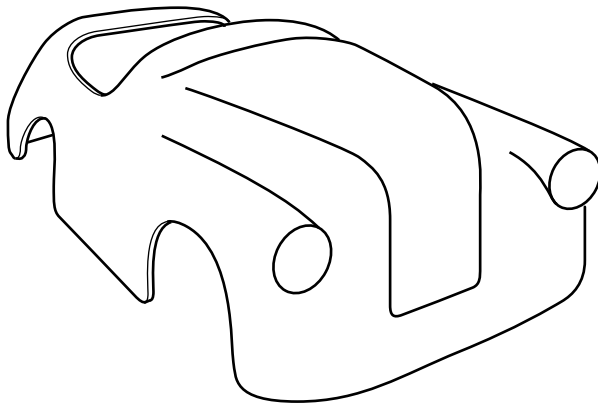
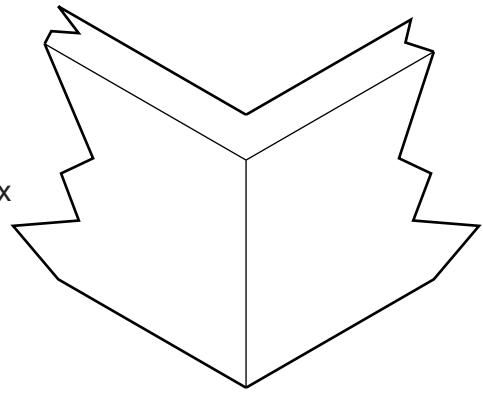
## Part A – Product Design

1



**item:** part of bicycle frame  
**process:** welding

**item:** corner of wooden jewellery box  
**process:** jointing



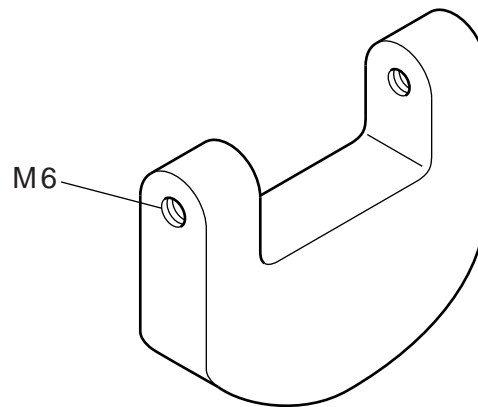
**item:** toy car body  
**process:** layup with GRP

**Fig. 1**

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

- (a) use notes and sketches to describe the manufacture of the item using the process given; [7 × 2]
- (b) explain why the process is particularly suitable for the production of the item. [3 × 2]

2 Fig. 2 shows the frame of a micrometer.



**Fig. 2**

- (a) State a suitable material for the frame and give **two** reasons for your choice. [3]
- (b) Describe, using notes and sketches, how you would make the frame. [9]
- (c) Explain the changes which may be necessary to the design, the manufacturing method used and in the material selected, if 1000 were required. [8]  
Use notes and sketches to support your answer.
- 3 Discuss how designers take into account variation in human sizes when designing products. [20]

## Part B – Practical Technology

- 4 Computers have had a significant impact on the Product Design Industry.
- (a) Describe **two** specific ways in which computers are used in the design of products. Explain the benefits to the designer of each. [10]
- (b) Describe **two** specific ways in which computers are used in the manufacture of products. Explain the benefits to the manufacturer of each. [10]
- 5 Fig. 3 shows four electronic components.

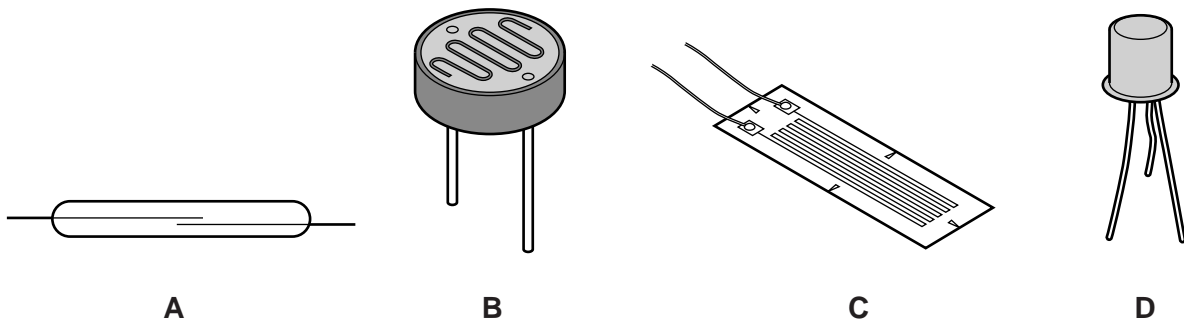


Fig. 3

- (a) Name and describe the function of each of the components **A–D**. [8]
- (b) Use notes, sketches and/or circuit diagrams to explain an appropriate application for each of the components. [12]
- 6 Fig. 4 shows the load/extension diagram for three different materials.

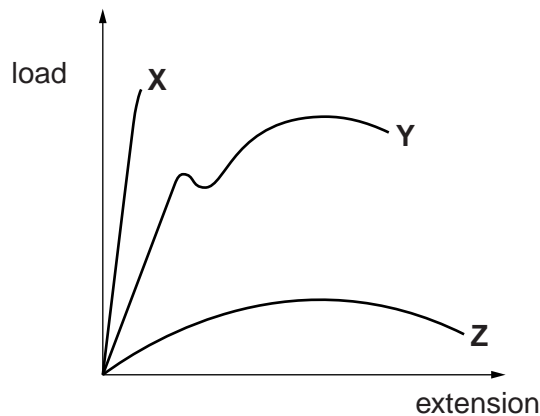


Fig. 4

- (a) Describe the specific information that can be obtained from Fig. 4 about materials **X**, **Y** and **Z**. [6]
- (b) The information shown in the diagram was obtained by tensile testing. Use sketches and notes to describe a method of testing a material's resistance to impact. [6]
- (c) Explain the importance of non-destructive testing. Use a specific test to support your answer. [8]

## Part C – Graphic Products

- 7 Discuss the implications of the packaging of products to the manufacturer and the consumer. [20]
- 8 Fig. 5 shows an exploded pictorial drawing of a simple micrometer.

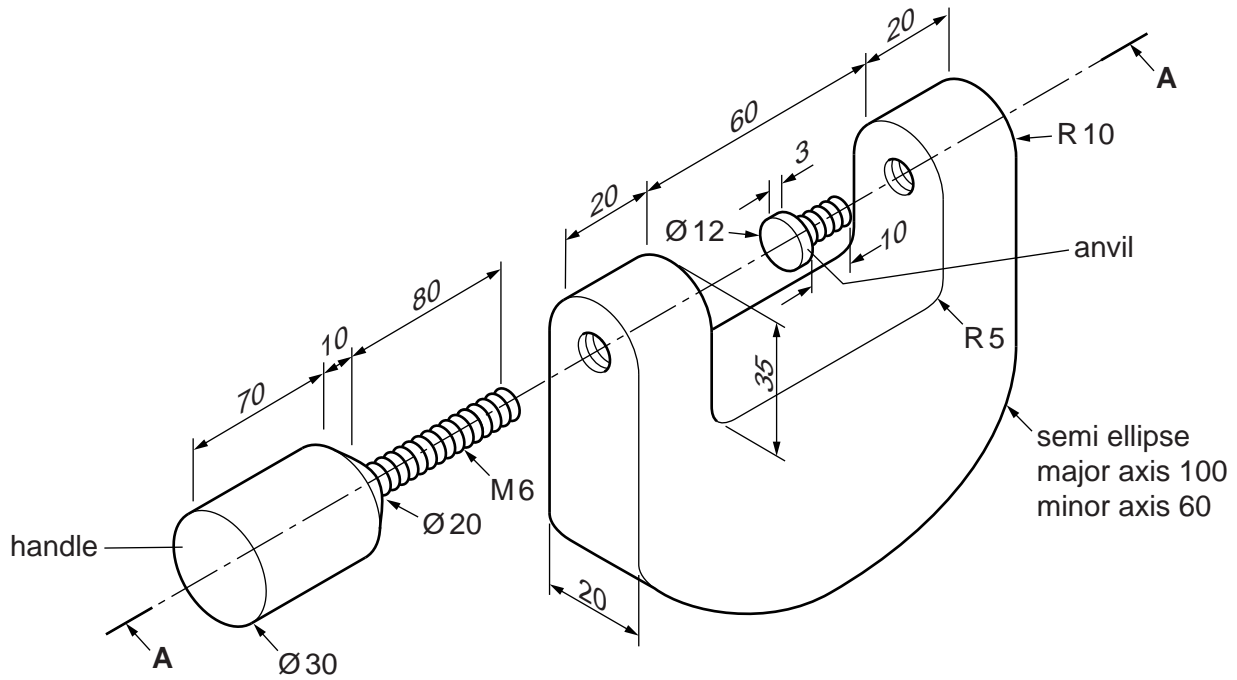
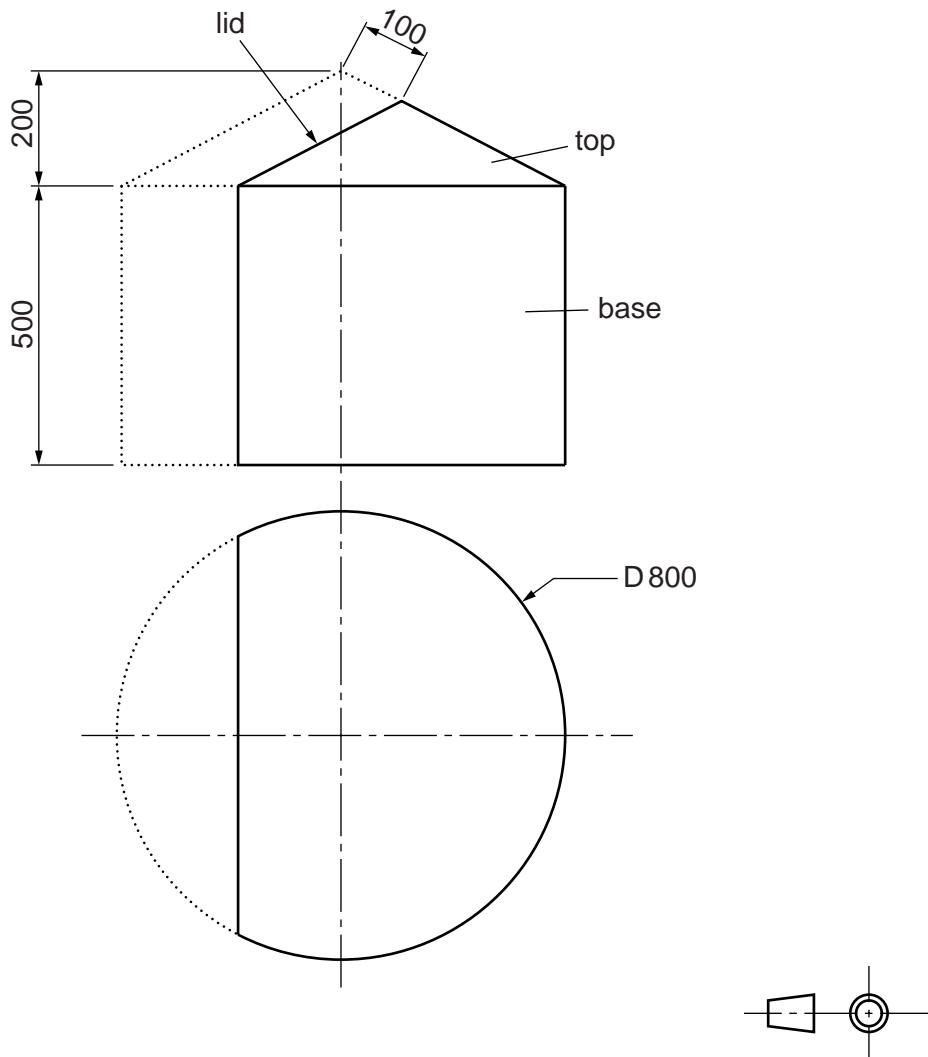


Fig. 5

- (a) The micrometer should be assembled with the M6 threaded bar touching the anvil.  
Draw full-size:
- a sectional elevation on A–A; [16]
  - a plan.
- (b) Sketch **two** different ways of improving the grip on the handle. [4]

9 Fig. 6 shows incomplete orthographic views of a paper recycling bin.



**Fig. 6**

- (a) Draw, to an appropriate scale, the complete plan view. [5]
- (b) Construct the true shape required for the lid. [5]
- (c) The bin is made from corrugated card.  
Use sketches and notes to show:
- (i) how the top would be connected to the base so that it could be easily removed; [5]
- (ii) how a lid could be attached to the top. [5]

**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

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

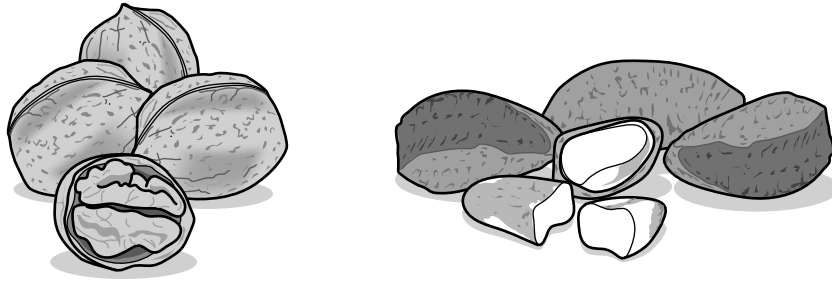
Produce drawings of an appropriate kind to show the complete solution. [15]

Evaluation

Give a written evaluation of the final design solution. [5]

[Total: 80]

10



Brazil nuts and walnuts have hard shells and are very difficult to crack to obtain the edible part inside.

You are to design a product that will hold a variety of nuts and include a method of cracking them.

The product must:

- be able to be used effectively by a wide range of users from the age of 14 upwards;
- be suitable to be used on a dining table.

To assist you in your answer, details of the sizes of nuts are given in Fig. 7.

Brazil nut:  
Max 40 × 25 × 20



Walnut:  
Max 35 × 30 × 30

**Fig. 7**

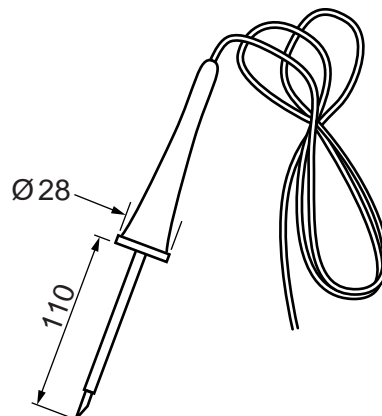
**11** A school's Design and Technology Department carries out a lot of practical electronics work.

You are to design a soldering unit for the Design and Technology Department to enable accurate soldering of components onto printed circuit boards (PCB).

The soldering unit must:

- hold the hot soldering iron safely;
- hold a PCB (max size 160 × 100) at a range of heights and angles.

Fig. 8 shows details of a soldering iron.



**Fig. 8**



12 A company wishes to increase its range of products after disappointing sales figures.

The current packaging is shown in Fig. 9.

A new chocolate shape is shown in Fig. 10. The shapes are to be sold in packs of 36.

You are to design a **new** innovative package for the chocolate shapes.

The packaging must:

- hold the shapes securely, to avoid damage in transportation;
- include a name for the product and suitable graphics to excite and interest consumers.

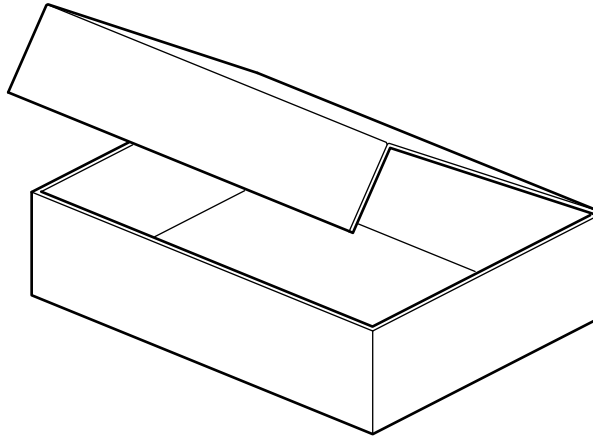
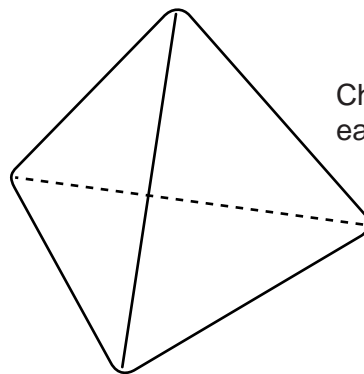


Fig. 9



Chocolate shape,  
each side 25 long

Fig. 10





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