

DESIGN AND TECHNOLOGY

9705/33

Paper 3

October/November 2014

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 **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.

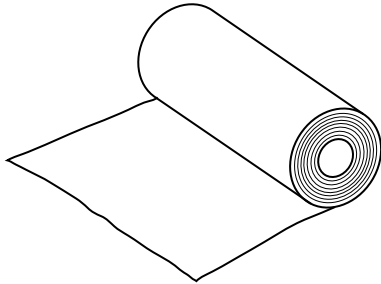
This document consists of **10** printed pages and **2** blank pages.

Section A

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

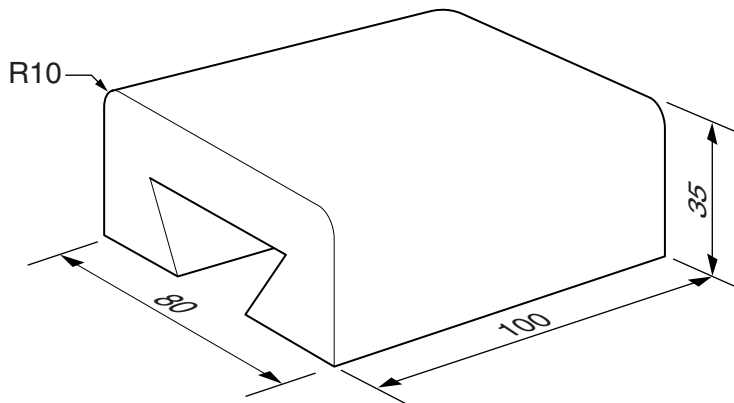
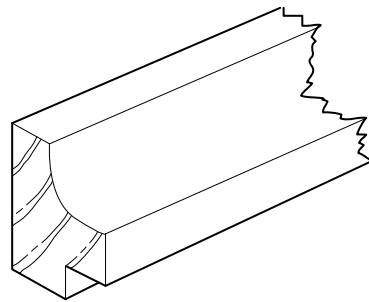
Part A – Product Design

1



item: film for wrapping food
process: calendering

item: wood section for mirror frame
process: profile moulding



item: dovetail cross slide
process: milling

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]

3

2 Fig. 2 shows the parts of a screwdriver.

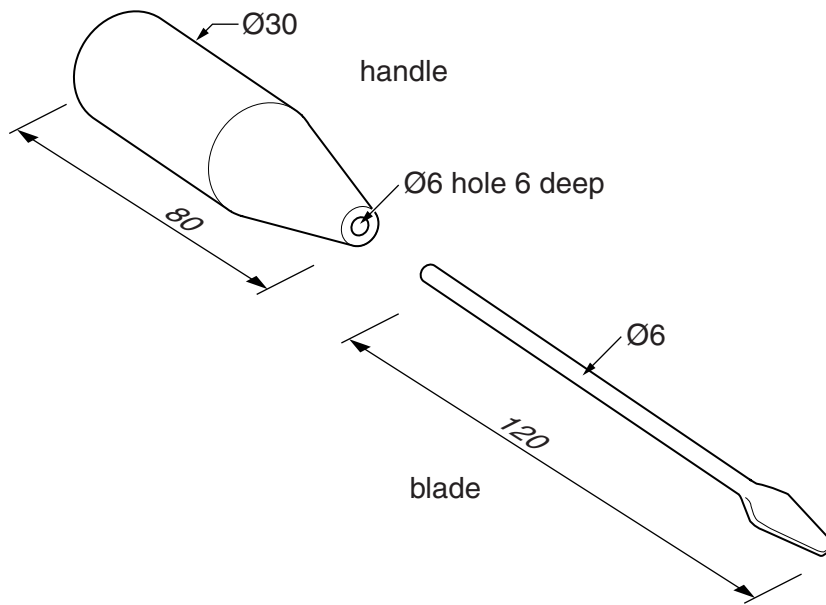


Fig. 2

Select **either** the handle **or** the blade. Write down your choice.

- (a) 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 your chosen part. Include details of how you would shape and finish the part to a high standard. [9]
- (c) Explain the changes which may be necessary to the design, the manufacturing method used and the material selected, if 1000 parts were required. Use notes and sketches to support your answer. [8]

3 Discuss the issues to be considered when deciding upon the retail price for a product. [20]

Part B – Practical Technology

4 Fig. 3 shows a gear train.

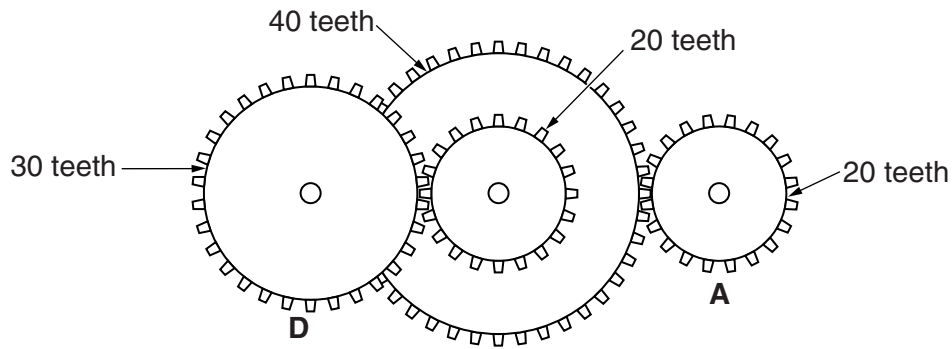


Fig. 3

- (a) (i) Gear **A** rotates anti-clockwise, state the direction of rotation of gear **D**. [1]
- (ii) Calculate the gear ratio of the gear train shown in Fig. 3. [3]

(b) Fig. 4 shows a loaded beam.

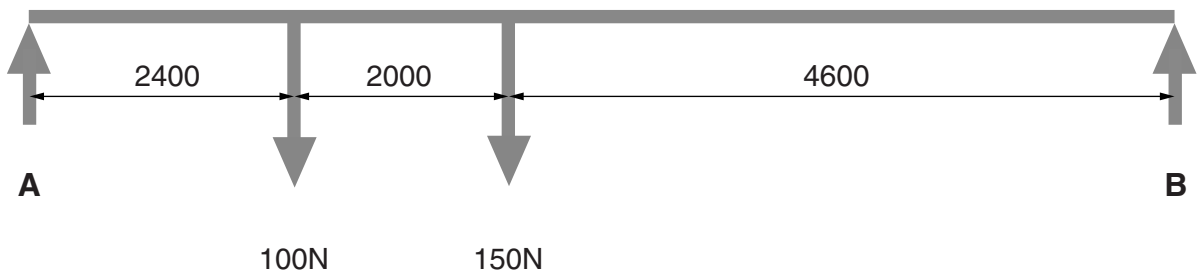


Fig. 4

Calculate the reactions at **A** and **B**. [4]

- (c) Many manufactured structures have to be reinforced to ensure stability, reliability and safety. Explain, using notes and sketches, **three** different ways in which manufactured structures can be reinforced. [12]

5

5 Fig. 5 shows four methods of transferring motion.

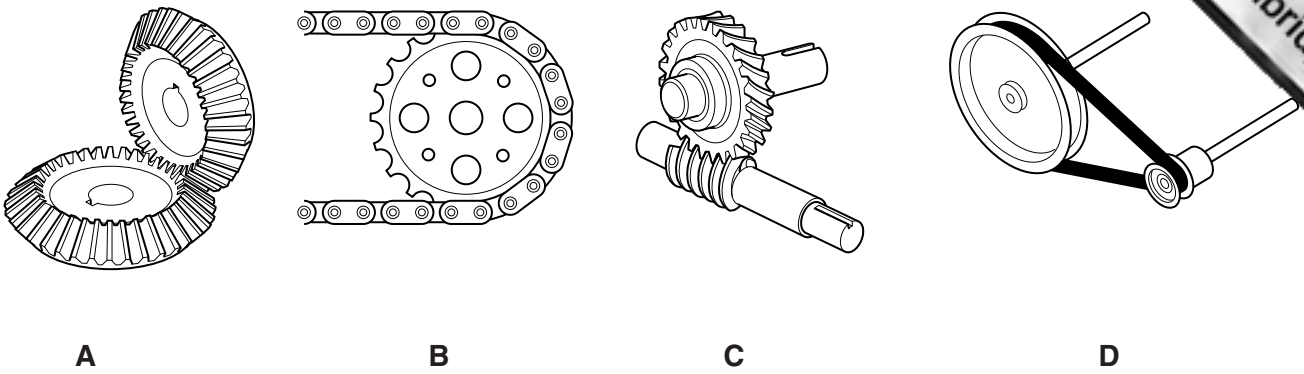


Fig. 5

- (a) Name the methods of transferring motion shown in Fig. 5. [4]
- (b) For each of the methods shown in Fig. 5, select a different product or application and explain why the method selected is appropriate. [4 × 3]
- (c) For **one** of the methods shown in Fig. 5, explain how the choice of materials affects performance. [4]

6 Material may be cut and removed by the use of:

- wedge shaped cutting tools;
- heat;
- a shearing action.

Select **two** of the methods above and for each:

- (a) use notes and sketches to describe an example of its appropriate use; [2 × 7]
- (b) explain why the method is particularly suitable. Use notes and sketches to describe in detail the key features of methods chosen. [2 × 3]

6

Part C – Graphic Products

7 Fig. 6 shows a diagram of a writing desk with the lid lowered.

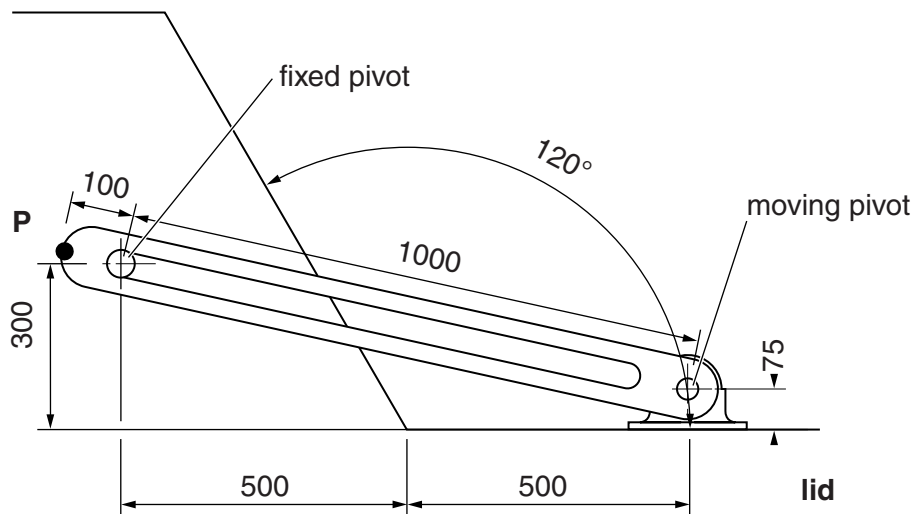


Fig. 6

- (a) To an appropriate scale, plot the loci of point **P** as the lid is closed. [12]
- (b) Describe in detail how you would model the opening and closing mechanism to ensure that it works effectively. Use notes and sketches to support your answer. [8]

8 Graphic designers use a range of methods and techniques to record and display information, ideas and processes.

Use notes and sketches to explain the following and give an appropriate example of each.

- Flow charts
- Pie charts
- Pictograms
- Ideograms

[4 × 5]

9 Fig. 7 shows a component from a child's construction toy.

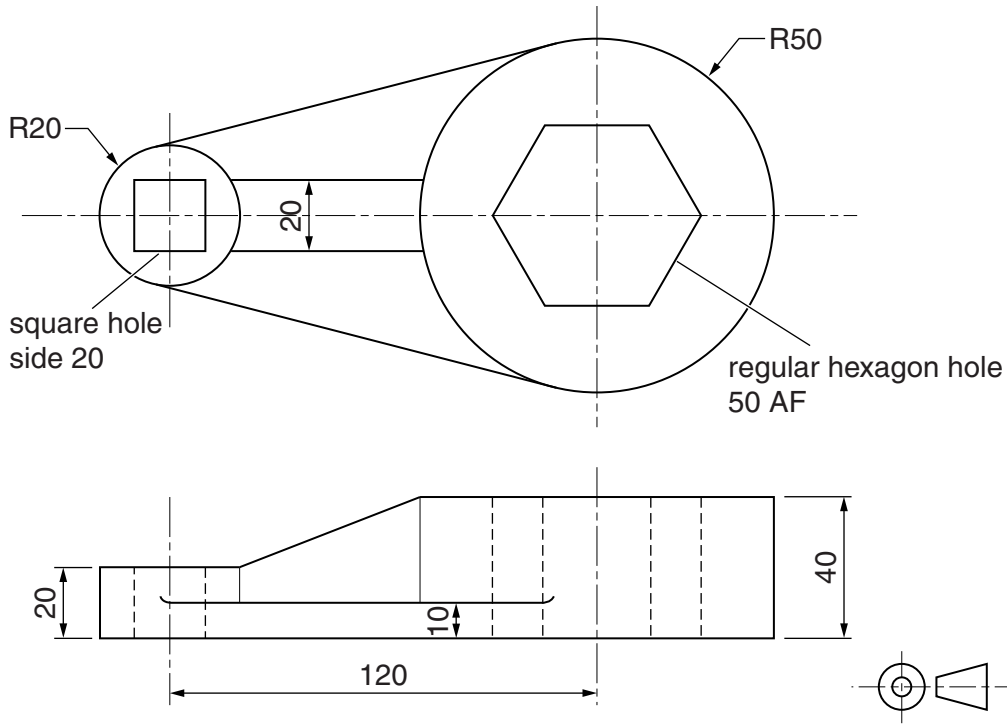


Fig. 7

Construct a full size isometric drawing of the component.
Use thick and thin line technique to enhance the drawing.

[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

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 school wishes to develop new resources to make learning for younger children more motivating and exciting.

Design an interactive resource to help young children to improve their learning of the basic skills of addition and subtraction.

The resource must:

- have a range of different activities;
- include the easy storage of parts.

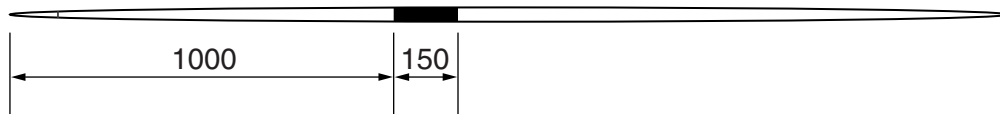
- 11 Some school sports equipment can be dangerous when being transported by staff and senior students to the sports field.

Design a product to transport javelins to the sports field.

The product must:

- transport up to 10 javelins;
- hold the javelins securely while being transported.

To assist you in your design, details of a javelin are shown in Fig. 8.



max $\text{Ø}30$
min overall length 2200
max overall length 2700

Fig. 8

12 Many sports clubs serve hot drinks. There is a concern that the disposable cups used for hot drinks do not insulate well and transporting the drinks can be dangerous.

Design a product to transport hot drinks in disposable cups, for a sports club of your choice.

The product must:

- hold up to four cups;
- include graphics to reflect the image of your chosen sports club.

To assist you in your design, details of the disposable cup are shown in Fig. 9.

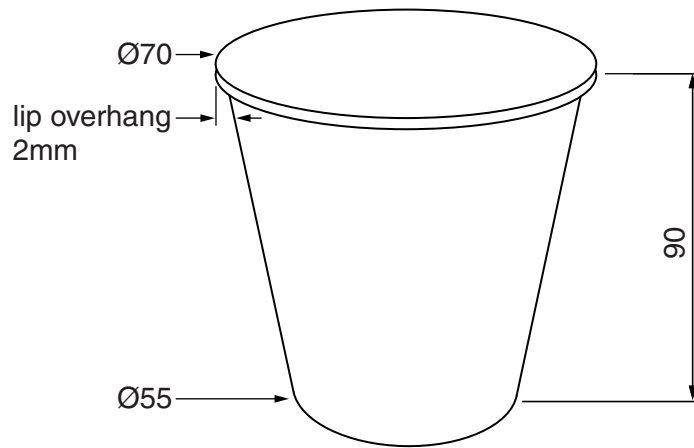


Fig. 9

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