

**DESIGN AND TECHNOLOGY**

9705/32

Paper 3

October/November 2016

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 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.

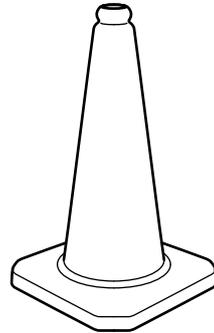
This document consists of **8** printed pages.

**Section A**

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

**Part A – Product Design**

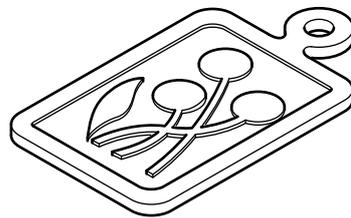
1



**item:** traffic cone  
**process:** rotational moulding



**item:** wooden skittle  
**process:** turning



**item:** pendant  
**process:** etching

**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; [7 × 2]
- (b) explain why the process is particularly suitable in the production of the item. [3 × 2]

2 Fig. 2 shows a snow ski bike.

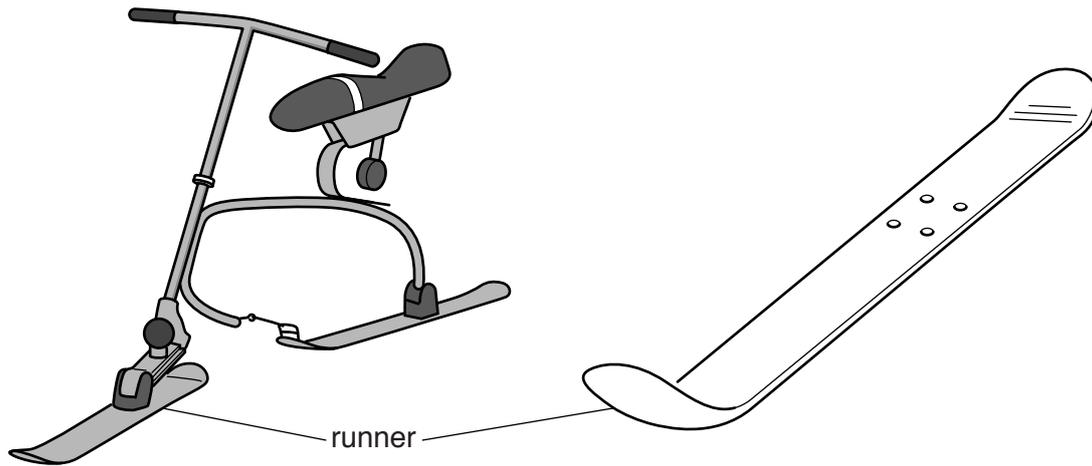


Fig. 2

- (a) State a suitable material for the runner for a snow ski bike of the type shown in Fig. 2 and give **two** reasons for your choice. [3]
- (b) Describe, using notes and sketches, how you would make the runner for a snow ski bike. [9]
- (c) Explain the changes which may be necessary to the design, the manufacturing method used and the material selected, if 1000 runners were required. Use notes and sketches to support your answer. [8]

3 Using sharp and well maintained tools is important when making quality products.

Select **two** of the tool groups listed:

- Lathe tools
- Hand tools
- Drills

For each:

- (a) identify one specific tool from each tool group selected and describe its function; [4]
- (b) use notes and sketches to describe the cutting action of each of the tools identified in part (a). [8]
- (c) Use notes and sketches to describe how you would maintain a sharp cutting edge on each of the specific tools identified in part (a). [8]

Part B – Practical Technology

- 4 (a) Define the terms:
- Toughness
  - Elasticity [2]
- (b) State **one** material that is tough and **one** material that is elastic. [2]
- (c) Use notes and sketches to describe a method of comparing the tensile strength of materials. [10]
- (d) Explain the importance of tensile testing to a designer/engineer when developing new products [6]
- 5 (a) Use labelled sketches and diagrams to describe **three** of the following mechanisms. For each, state a product that includes the mechanism.
- Ratchet
  - Cam
  - Lever
  - Crank
  - Gear train [12]
- (b) Explain what is meant by the terms:
- Mechanical advantage
  - Velocity ratio [8]
- 6 Some materials can be reformed, reshaped and joined together using heat.
- (a) Use notes and sketches to describe how an LED would be soldered onto a printed circuit board. [7]
- (b) Use notes and sketches to describe how the golf putter head shown in Fig. 3 would be die cast. [7]

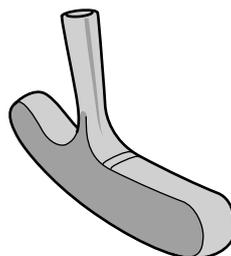


Fig. 3

- (c) Explain the differences between hard soldering and welding. Give **one** example of a suitable application of each method. [6]

Part C – Graphic Products

- 7 Discuss the factors that a design company would consider when selecting the scale of production to be used in the manufacture of a new product. [20]
- 8 Fig. 4 shows a child's toy.

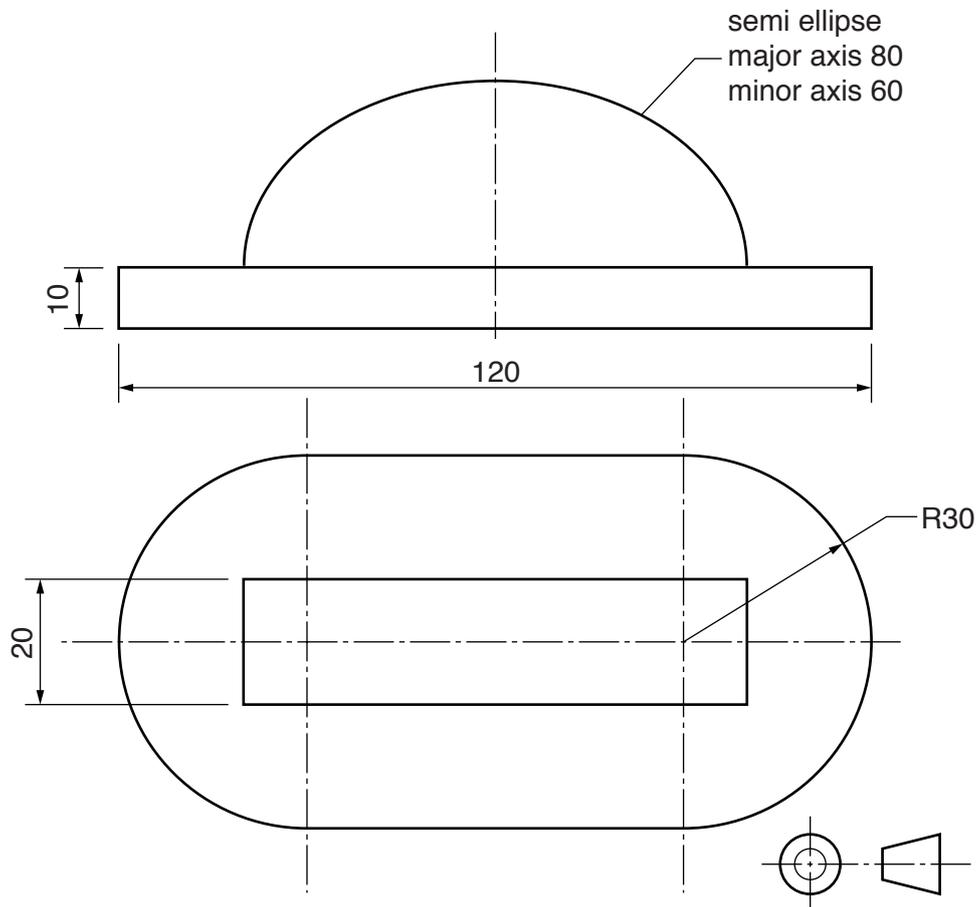
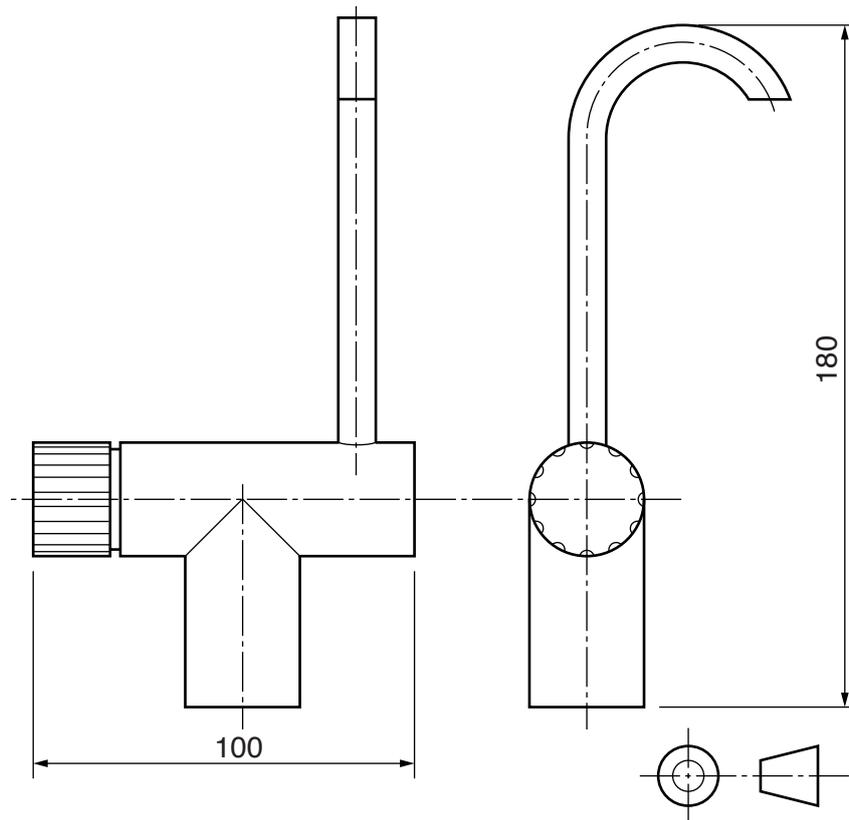


Fig. 4

- (a) Draw a full size isometric view of the child's toy. [12]
- (b) Explain the differences between planometric and perspective drawing systems and give an example where each would be used by a designer or an architect. [8]

9 Fig. 5 shows orthographic views of a kitchen tap.



**Fig. 5**

- (a) Sketch an approximate full size pictorial drawing of the kitchen tap. Render the sketch to show that the tap has a shiny chrome finish. [10]
- (b) Communicating ideas is important to a designer. Explain the reasons why a designer would use each of the following forms of communication. Give a specific example where each form of communication is appropriate:
- Initial design ideas
  - A working drawing
  - A presentation image [10]

**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** An increasing number of adults are making greater efforts to exercise more and maintain a healthy lifestyle.

Design a product that can be used in the home or garden to provide exercise.

The product must:

- be easy to store away when not in use;
- encourage the user to improve fitness.

- 11** Children often get bored when travelling in a car, bus or train.

Design a game or toy that can be used on a long journey.

The game or toy must:

- have an electronic and/or mechanical feature;
- be able to be used by one or more children.

- 12** A school wishes to reward the success of students in particular school subjects by posting a celebration card home to parents/guardians.

Design a card to celebrate the success of a student in a school subject of your choice.

The card must:

- have a 'pop up' or interactive feature;
- reflect the school subject.

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