Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

DESIGN AND TECHNOLOGY **6043/01**

Paper 1 Technology **October/November 2016**

2 hours 30 minutes

Additional Materials: Answer Booklet/Paper
Plain paper
Sketching equipment

2686045432

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on 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.

Part A
Answer **all** questions.

Part B
Answer **four** questions.
Answer **two** questions from Section 1 and **two** questions from Section 2.

You are advised to spend no longer than 45 minutes on Part A.
Use sketches where appropriate to help answer any question. You may use coloured pencils.
All dimensions are in millimetres.
The number of marks is given in brackets [ ] at the end of each question or part question.

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

This document consists of **12** printed pages.

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Part A

Attempt **all** questions.

1 Fig. 1 shows a plastic bucket.

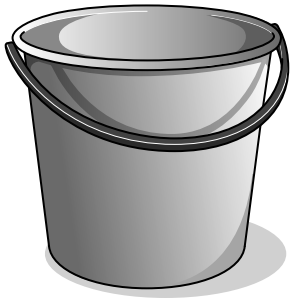


Fig. 1

(a) State a suitable plastic for the manufacture of a plastic bucket.

(b) Give a reason for your choice of plastic. [2]

2 Sketch the following marking out tools.

(a) marking gauge

(b) scriber [4]

3 **(a)** Define what is meant by the terms:

(i) ductility

(ii) elasticity. [2]

(b) Name a material that is:

(i) ductile

(ii) elastic. [2]

4 Fig. 2 shows a tool used on a lathe.

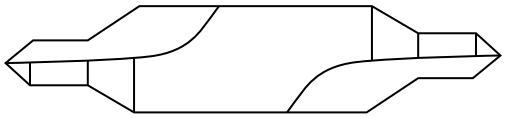


Fig. 2

Name the tool shown in Fig. 2 and describe how it is used. [2]

5 Fig. 3 shows a wood joint.

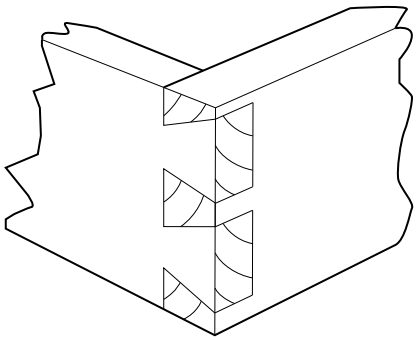


Fig. 3

(a) Name the wood joint shown in Fig. 3.

(b) Identify a product which uses the wood joint in its construction and explain why the joint is appropriate. [3]

6 A former used on a vacuum forming machine has features that ensure successful forming.

Use a sketch to show **two** features of a former that will ensure a successful vacuum formed shape. [2]

7 Give **two** reasons why aluminium is used for the manufacture of window frames. [2]

8 Name the abrasive that would be used to:

(a) finish the edge of a piece of acrylic sheet

(b) smooth the surface of a length of 50 × 25 section softwood

(c) clean the surface of a length of 18 × 3 section mild steel strip. [3]

9 Use a sketch to show how you would plane the end grain of the hardwood shelf shown in Fig. 4. [2]

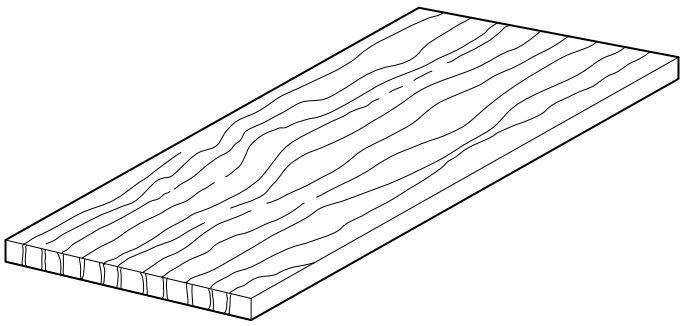


Fig. 4

10 (a) A key tag with keys and the key tag shape are shown in Fig. 5.
Two identical acrylic key tags are required.

Describe how you would mark out the shapes on a sheet of acrylic.

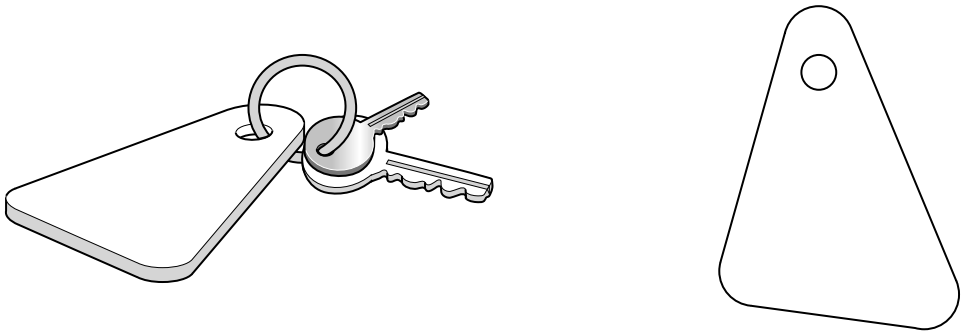


Fig. 5

(b) Fig. 6 shows an acrylic shape which is to be added to the key tag.

Describe how you would permanently attach the shape to the key tag.

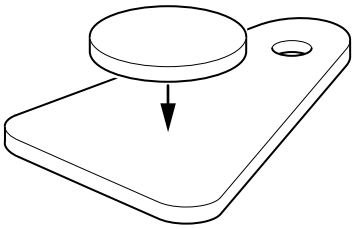


Fig. 6

[4]

Part B

Attempt **four questions**, **two** from Section 1 and **two** from Section 2.

All questions carry equal marks.

Section 1 – Tools and Materials

11 Three different saws are shown in Fig. 7.

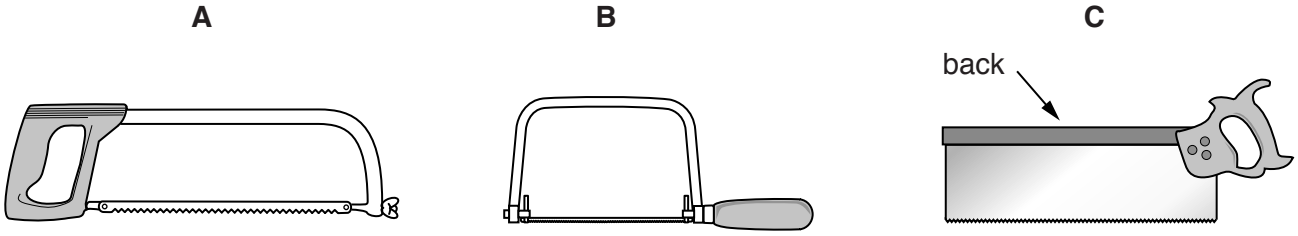


Fig. 7

(a) Name the saws shown in Fig. 7 and state a use for each. [6]

(b) Explain:

(i) why the blade in saw **A** can be fixed at 90° to its normal cutting position

(ii) how the blade is held and tensioned in saw **B**

(iii) the purpose of the 'back' on saw **C.** [6]

(c) Sketch the following and explain the purpose of each.

(i) tension file

(ii) hole saw [6]

12 Modern and smart materials are being increasingly used in the design and manufacture of products.

(a) Copy and complete the chart below.

Smart material	Properties/function	Product application
Colour changing materials		
Shape memory alloys		
Quantum-tunnelling composite		
Piezo electric materials		

[12]

(b) Briefly explain the sustainability issues relating to products made of **two** of the following material groups.

(i) wood

(ii) metal

(iii) plastic [6]

13 Fig. 8 shows items of personal protection equipment that would be used in workshops.

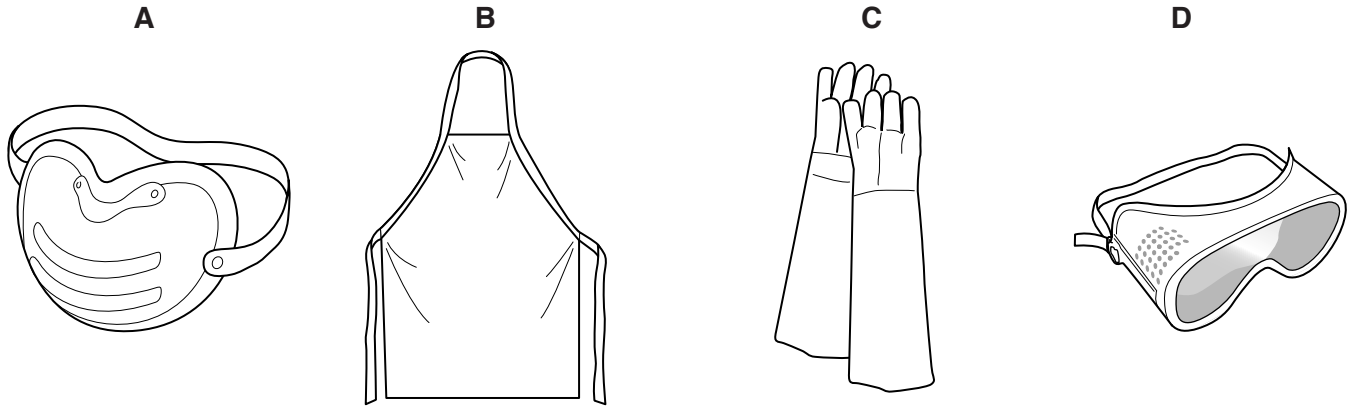


Fig. 8

(a) Name and describe a specific use for each item of personal protection equipment shown in Fig. 8. [8]

(b) Describe the health and safety precautions, other than the wearing of personal protection equipment, that you would consider when:

(i) using a wood chisel in a workshop

(ii) facing off a length of Ø20 aluminium bar

(iii) working with a contact adhesive. [6]

(c) Describe, using a sketch and notes, how you would safely drill a Ø10 hole in the centre of a 500 × 500 sheet of 2 thick mild steel. [4]

[Turn over

14 Fig. 9 shows a prototype design of a cycle helmet for a young adult.

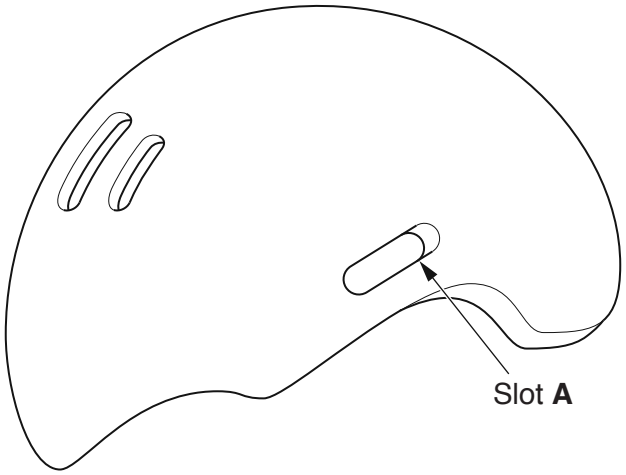


Fig. 9

(a) State **two** properties that a material should have to be suitable for a cycle helmet. [2]

(b) A range of materials for the cycle helmet was proposed but rejected. Give reasons why the following materials would not be suitable.

(i) Mild steel

(ii) Acrylic

(iii) Plywood [6]

(c) Describe **one** simple test that could be used to check that a material has appropriate properties to be used as a cycle helmet. [3]

(d) **(i)** State a suitable material to use to make the prototype cycle helmet. [1]

(ii) Sketch **two** tools that could be used to make slot **A** in the helmet. [6]

Section 2 – Processes

15 Fig. 10 shows the outline design of a toothbrush holder.

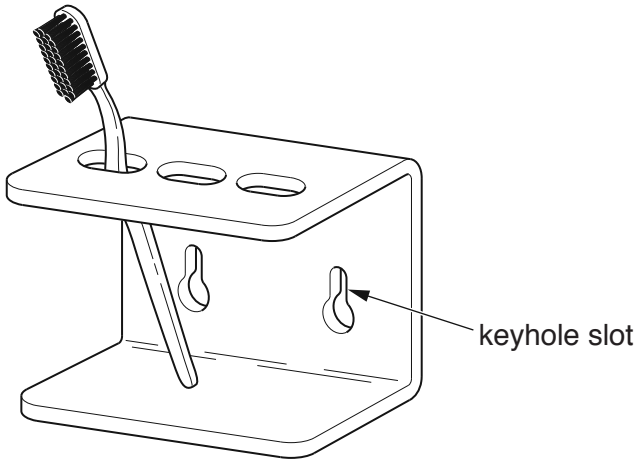


Fig. 10

(a) Choose a suitable material for the toothbrush holder and describe how you would finish the material. [2]

(b) For the material chosen in **(a)**, use sketches and notes to describe:

(i) the process of marking out the keyhole slots [4]

(ii) the process of cutting the slots for the toothbrushes [4]

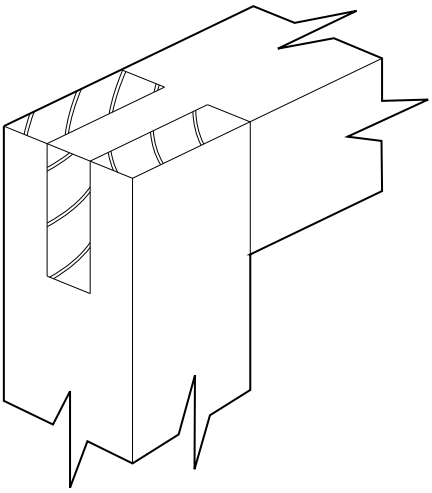
(iii) how the bends in the toothbrush holder would be formed. [5]

(c) The toothbrushes do not stand upright when placed in the holder.

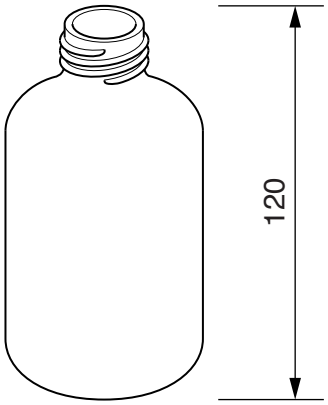
Use a sketch to show how you would modify the design to prevent this from happening. [3]

16 Choose **two** of the following processes from Fig. 11.
For each, use sketches and notes to describe how they are carried out.

(a) Cutting out a bridle joint for a chair frame made from hardwood.



(b) Blow moulding a HDPE shampoo container.



(c) Turning a brass light pull.

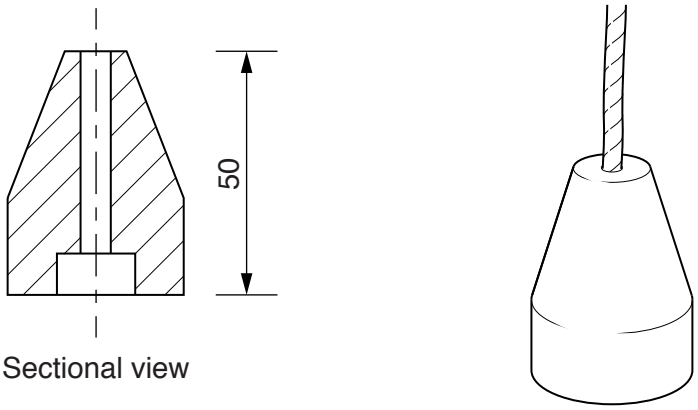


Fig. 11

[18]

17 Details of an idea for a study lamp are given in Fig. 12.

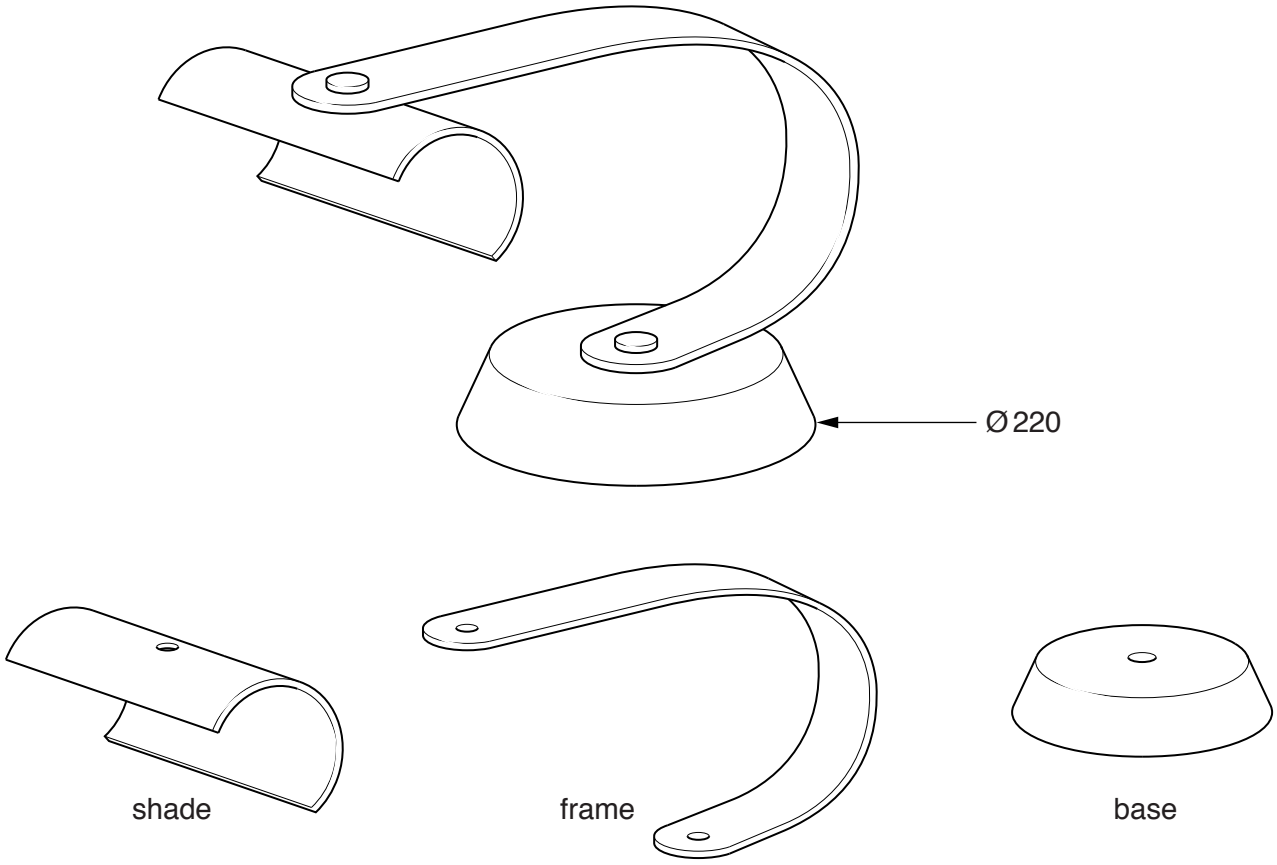


Fig. 12

(a) For each named part of the study lamp, identify suitable materials to be used and describe, using sketches and notes, the following processes:

(i) forming the frame to shape [5]

(ii) making the shade [5]

(iii) making the base. [5]

(b) Design, using a sketch and notes, a method of attaching the frame to the base that will allow the frame to rotate. [3]

18 The design for a child's toy is given in Fig. 13.

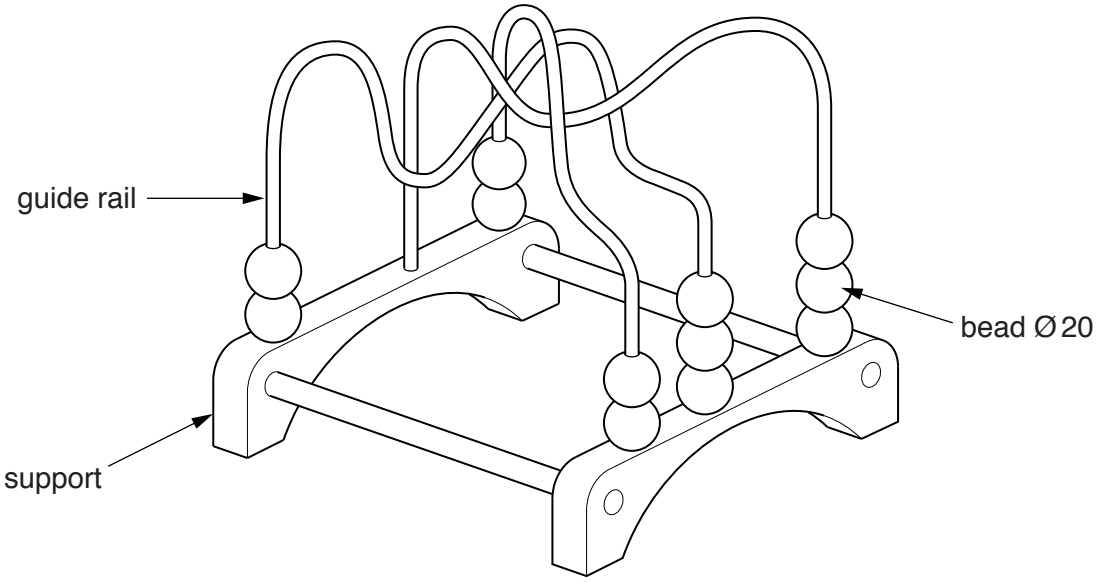


Fig. 13

(a) Suggest suitable materials for:

(i) the supports

(ii) the guide rails

(iii) the beads.

Give a reason for each choice. [3]

(b) Using the materials chosen in **(a)**, describe, using sketches and notes how to:

(i) cut one support to shape

(ii) join a guide rail to the support

(iii) make a bead. [12]

(c) Explain how you would apply colour to the guide rails and the beads. [3]