



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

\* 2 9 2 3 3 7 0 1 9 0 \*

**DESIGN AND TECHNOLOGY**

0445/31

Paper 3 Resistant Materials

October/November 2012

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

To be taken together with Paper 1 in one session of 2 hours 15 minutes.

**READ THESE INSTRUCTIONS FIRST**

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

**Section B**

Answer **one** question in this section.

You may use a calculator.

The total of the marks for this paper is 50.

The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
Section A	
Section B	
Total	

This document consists of 15 printed pages and 1 blank page.

Section A

Answer **all** questions in this section.

1 Name the three types of nail shown below.



.....

.....

.....

[3]

2 Name **two** tools used to cut out the dovetail joint shown in Fig. 1.

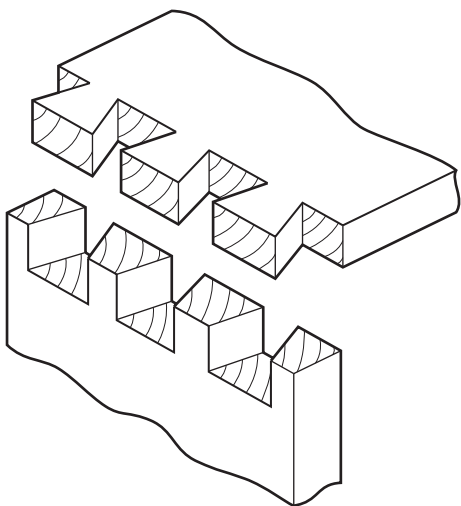


Fig. 1

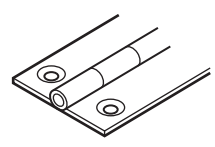
1 ..... [1]

2 ..... [1]

3 Describe how you would use contact (impact) adhesive to glue two pieces of wood together.

.....  
.....  
..... [3]

4 (a) Complete the drawing below to show a piano hinge.



[2]

(b) Give **one** benefit of using a piano hinge.

..... [1]

5 (a) Name the process used to make the plastic bottle shown in Fig. 2.

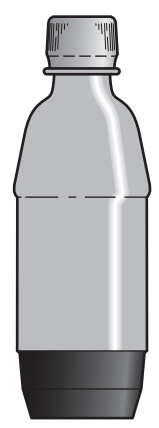


Fig. 2

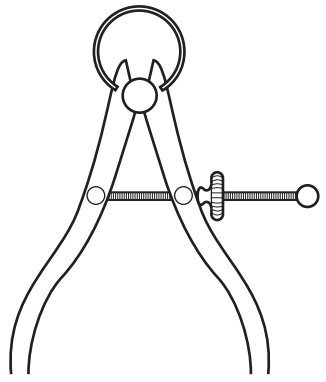
..... [1]

(b) Name a suitable specific plastic for the bottle.

..... [1]

4

6 Complete the drawing below to show outside calipers.



[2]

7 Name the saw shown in Fig. 3 and describe a specific use for the saw.

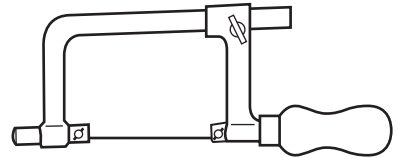
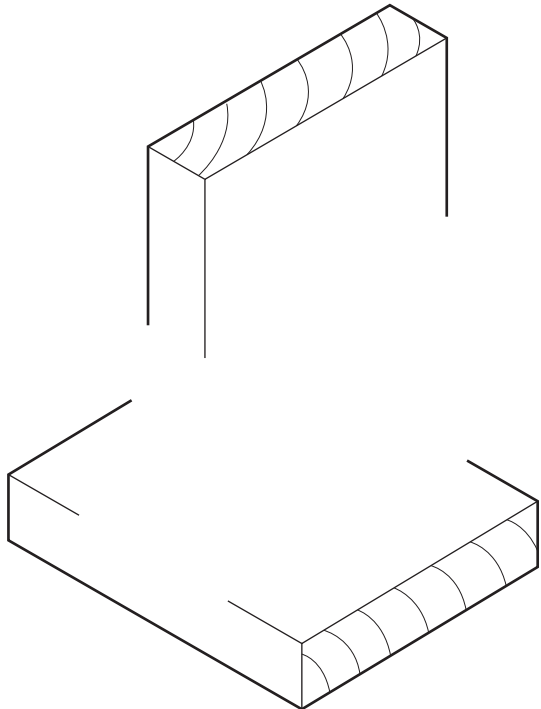


Fig. 3

Name of saw ..... [1]

Specific use ..... [1]

8 Complete the drawing below to show an exploded view of a stopped housing joint.



[3]

9 (a) Name the type of washer shown in Fig. 4.

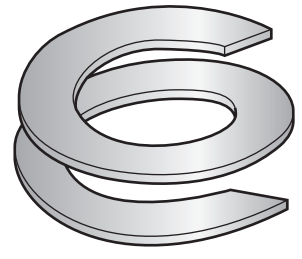


Fig. 4

..... [1]

(b) State the purpose of the washer.

..... [1]

10 Fig. 5 shows a brass disc being beaten into the shape of a dish.

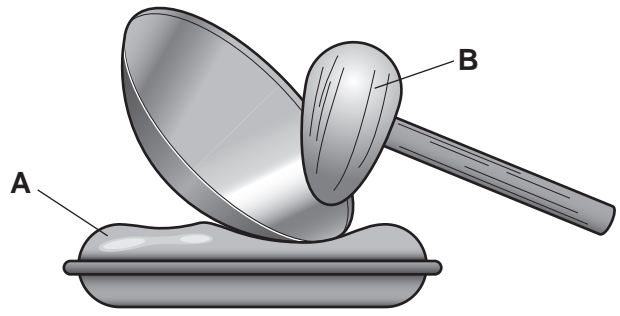


Fig. 5

(a) Name the process used to produce the shape.

..... [1]

(b) Name the **two** items of equipment labelled **A** and **B**.

**A** ..... [1]

**B** ..... [1]

Section B

Answer **one** question from this section.

11 Fig. 6 shows details of an incomplete toy made mainly from wood.

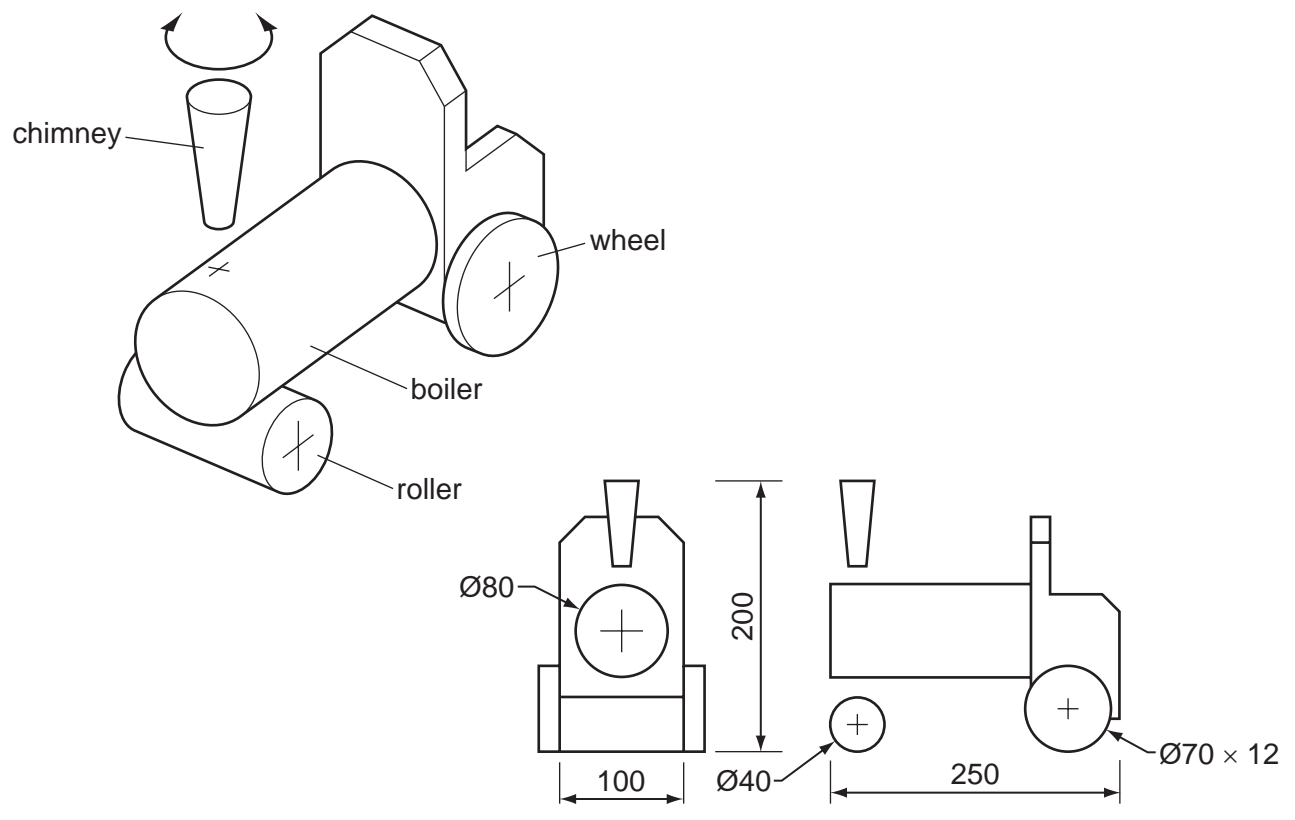


Fig. 6

(a) Name a suitable hardwood for the toy. Give **two** reasons for your choice.

Hardwood ..... [1]

Reason 1 ..... [1]

Reason 2 ..... [1]

(b) Show clearly how the wheels could be fixed to the toy, allowing them to rotate freely.

[4]

(c) When the toy is pushed or pulled, the roller will be steered by turning the chimney clockwise or anti-clockwise.

Use sketches and notes to show how the chimney and roller could be connected so that the toy could be steered. The roller must be able to rotate freely.

Include details of materials, constructions and fittings used.

[8]

(d) Use sketches and notes to show how the boiler could be made using a wood lathe.

Include details of the following stages:

- preparation of the wood before setting up on the lathe;
- setting up the wood on the lathe;
- turning the wood to shape;
- finishing the boiler, including the application of a finish.

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12 Fig. 7 shows details of an incomplete design for a tape dispenser. The support is made from thermoplastic sheet and the base from hardwood.

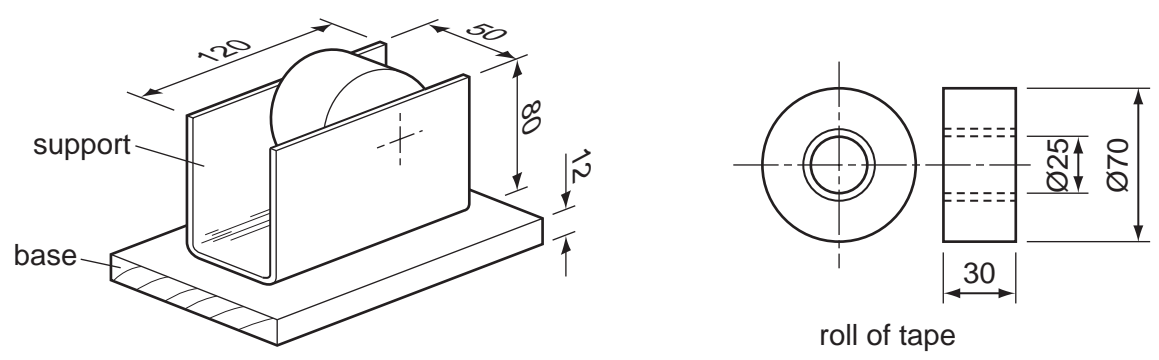


Fig. 7

(a) Give **one** advantage of using thermoplastic sheet rather than thermosetting plastic sheet for the support.

..... [1]

(b) Name **two** methods of heating the plastic sheet so that it could be bent to shape.

1 ..... [1]

2 ..... [1]

(c) Use sketches and notes to show:

- how the support could be fixed to the base;
- how the roll is allowed to rotate and can be replaced easily;
- a device that will cut the tape and leave a small amount for the next person using the tape;
- details of materials, constructions and fittings used.

(d) The support could be made by means of extrusion moulding. Fig. 8 shows an extrusion moulding machine.

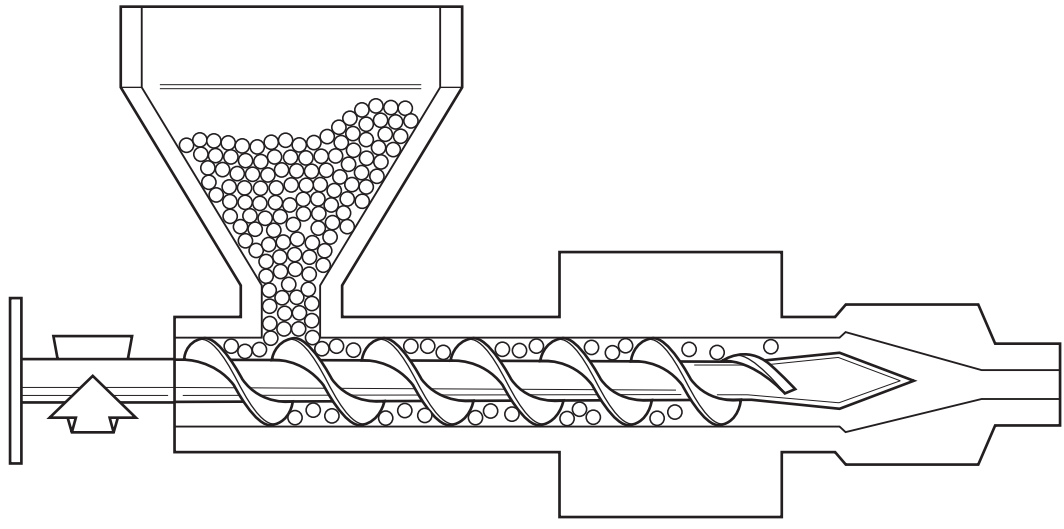


Fig. 8

Add notes to Fig. 8 to describe the process of extrusion.

[4]

(e) Fig. 9 shows a similar design of tape dispenser made from 1 mm thick aluminium.

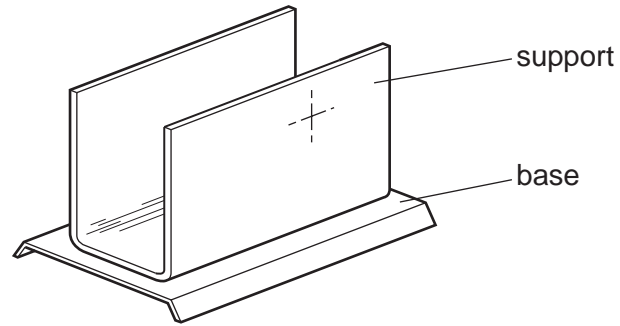


Fig. 9

Use sketches and notes to show how the support could be riveted to the base. Name all the tools and equipment used.

[6]

(f) The parts of the aluminium tape dispenser will be self-finished.

(i) State what is meant by the term *self-finished*.

.....  
 ..... [1]

(ii) Describe how the aluminium could be self-finished.

.....  
 ..... [2]

13 Fig. 10 shows views of a box periscope.

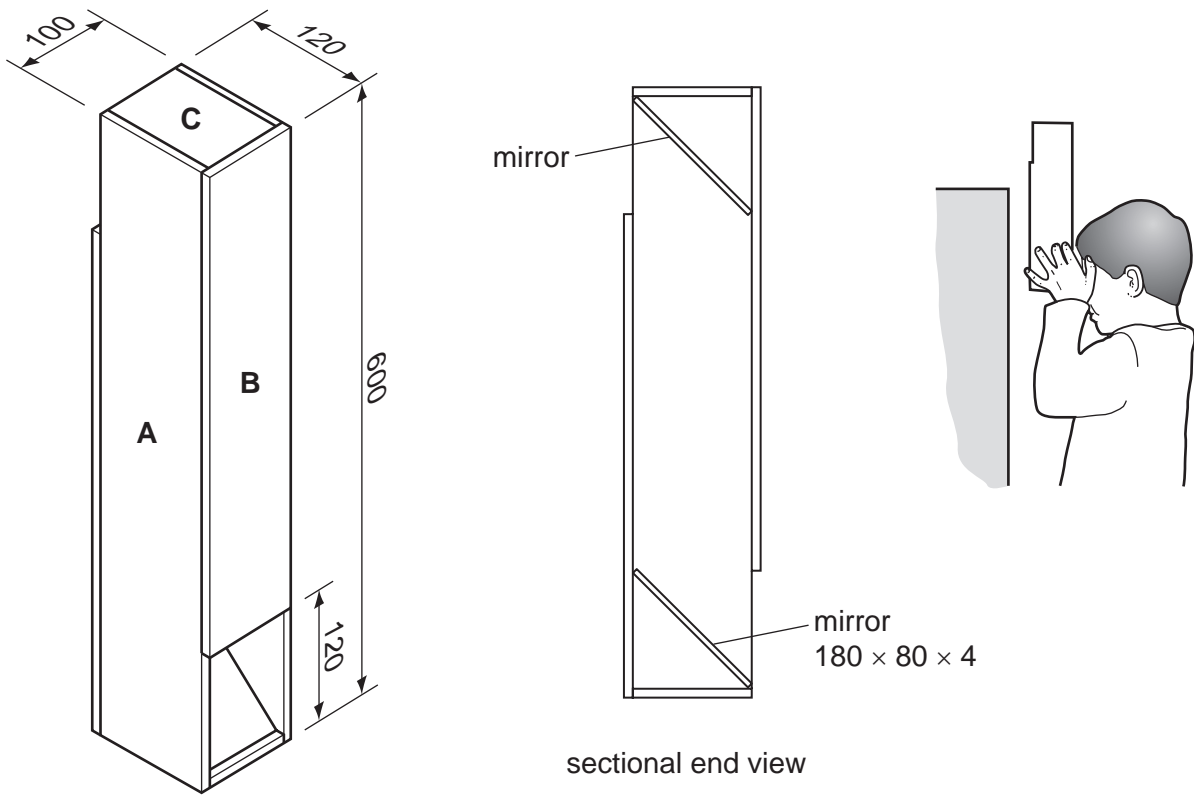


Fig. 10

(a) A cutting list of materials for the box periscope is shown below. Complete the cutting list.

Part	Number required	Sizes length x width x thickness	Material
A	2	600 x ..... x 9	plywood
B	2	..... x ..... x 9	plywood
C	2	111 x ..... x 9	plywood

(b) All the parts of the box periscope are screwed together. Use sketches and notes to show how sides **A** and **B** could be screwed together. Include the following details:

- the type of screws used: length, head and material;
- the number of screws used and their spacing.

[5]

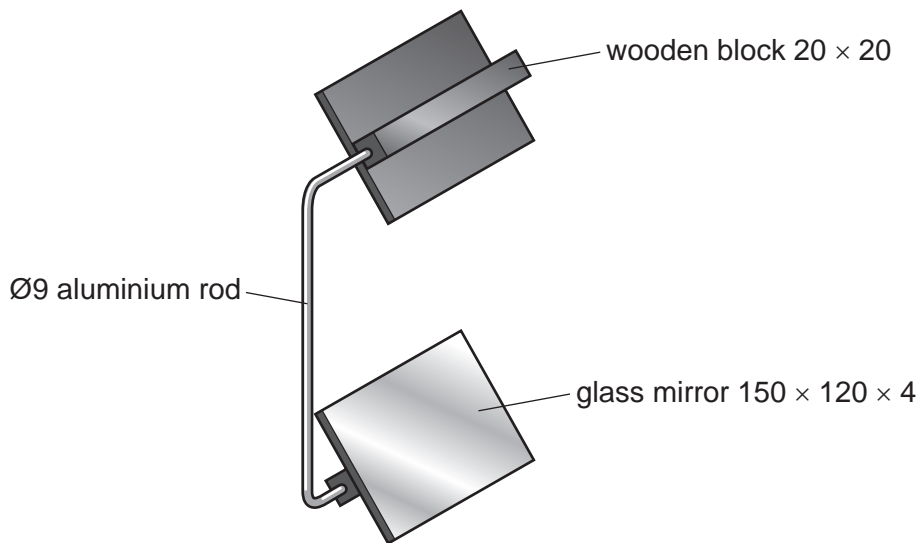
(c) Use sketches and notes to show how **one** glass mirror could be fixed permanently inside the box periscope.

[3]

- (d) The box periscope is not easy to hold. Use sketches and notes to show modifications to the design of the box periscope so that it could be held more easily. Include details of materials, constructions and fittings used.

[4]

- (e) Fig. 11 shows a design for an open frame periscope. The glass mirrors are glued into wooden blocks. The aluminium rod is bent to shape and glued into the wooden blocks.



**Fig. 11**

Use sketches and notes to show details of the following processes using the aluminium rod to make the open frame periscope:

- marking it to length;
- cutting it to length;
- bending it to shape;
- joining it to the wooden blocks.

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