



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

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DESIGN AND TECHNOLOGY

0445/03

Paper 3 Resistant Materials

May/June 2007

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 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 **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 **16** printed pages.



Section A

Answer **all** questions in this section.

1 State **one** method of joining the pieces of steel shown in Fig.1:

(a) permanently, without the use of heat or an adhesive;

..... [1]

(b) temporarily.

..... [1]

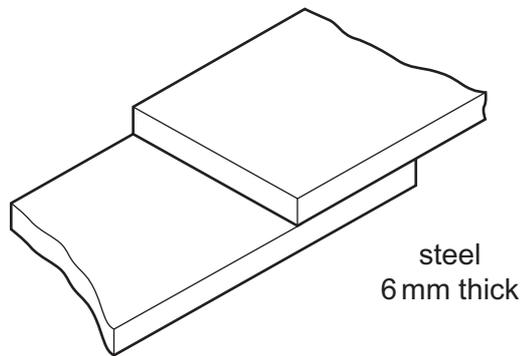


Fig. 1

2 Complete the table below.

Material	Property	Use
Copper		Water pipes
	Heat resistant	Saucepan handles
Blockboard		Table top
	Resists corrosion	Kitchen sink

[4]

3 Describe a situation in the workshop when the following items of safety equipment would need to be used:

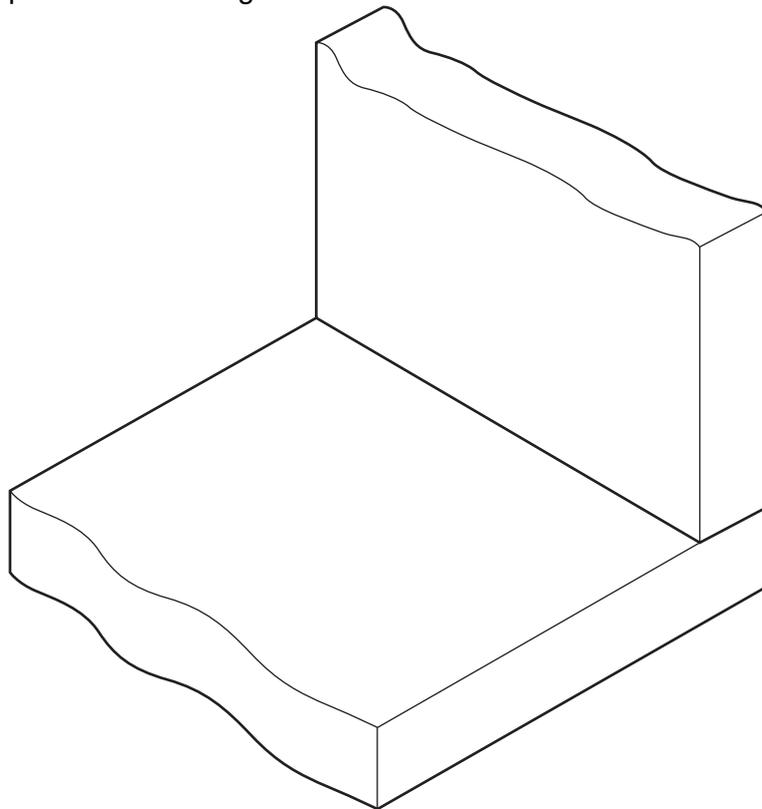
(a) face mask;

..... [1]

(b) ear defenders.

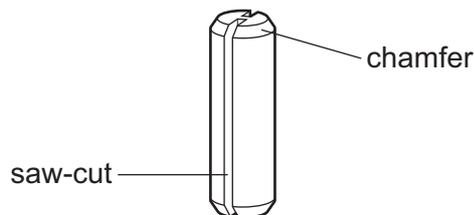
..... [1]

4 Complete the sketch below by adding a suitable knock-down (K-D) fitting that could be used to join the two pieces of wood together.



[2]

5 Explain the purpose of the chamfer and the saw-cuts in the dowel shown below when used in a glued dowel joint.



chamfer [1]

saw-cuts [1]

6 Name the type of hinge shown in Fig. 2.

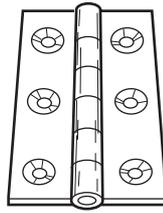


Fig. 2

..... hinge [1]

7 Fig.3 shows a plain drilled hole through a section of material.

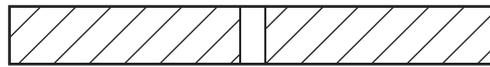
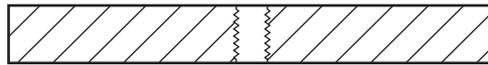


Fig. 3

Name the tool used to change a plain hole to:

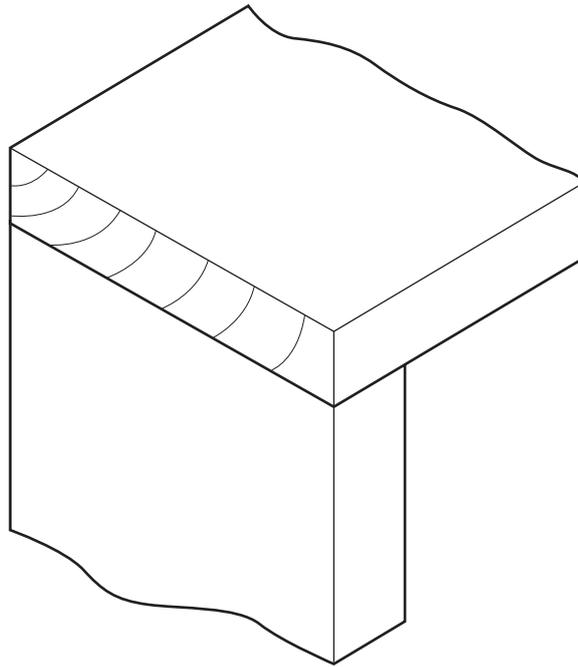


(a) tool used [1]



(b) tool used [1]

- 8 Complete the sketch of the joint below to show dovetail nailing.



[2]

- 9 Complete the table below by naming a suitable finish for each product and giving a reason for each choice.

Product	Finish	Reason
Copper jewellery		
Handle of electrician's pliers		

[4]

10 Fig.4 shows a 90° bend in sheet material.

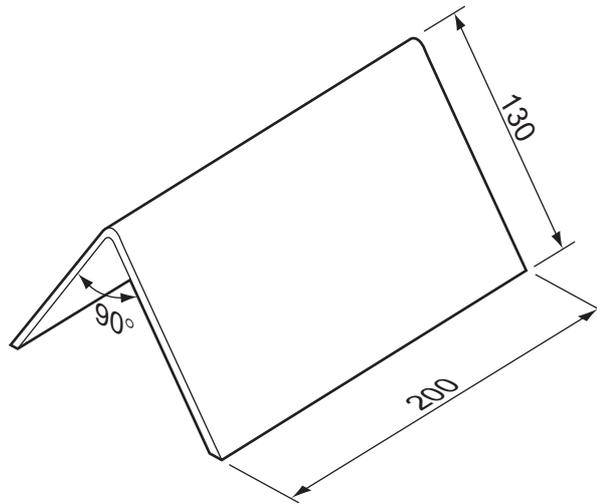


Fig. 4

Describe how you would produce a 90° bend in:

(a) 4 mm thick acrylic;

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

(b) 1 mm thick mild steel.

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

Section B

Answer **one** question from this section.

11 Fig.5 shows a child's push along tricycle made from solid wood and manufactured board.

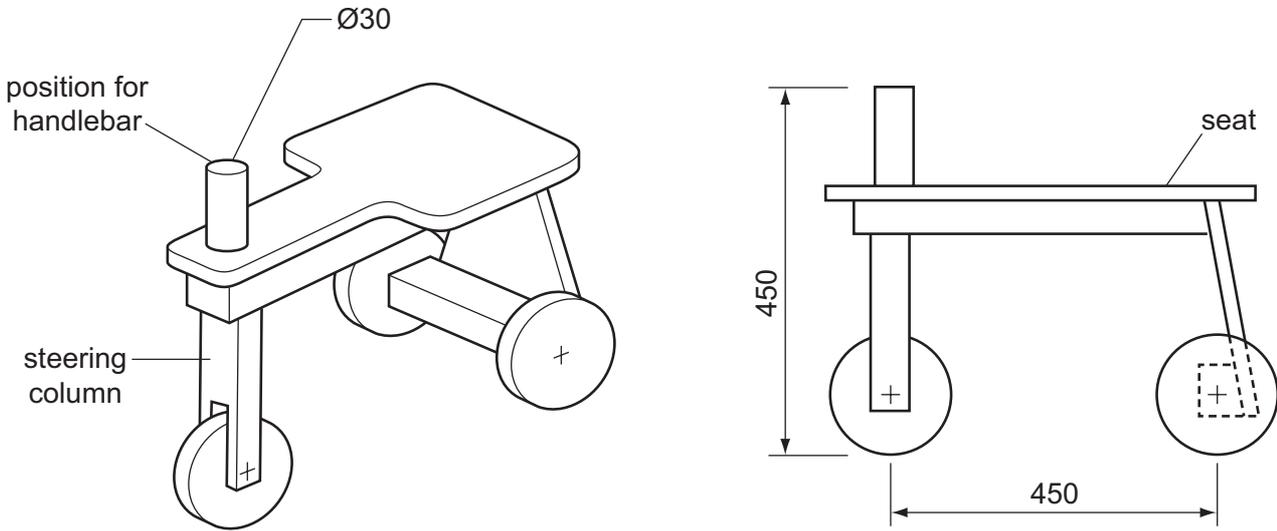


Fig. 5

(a) (i) Name a suitable manufactured board for the seat.

..... [1]

(ii) Give **two** reasons why a manufactured board would be more suitable than solid wood for the seat.

1 [1]

2 [1]

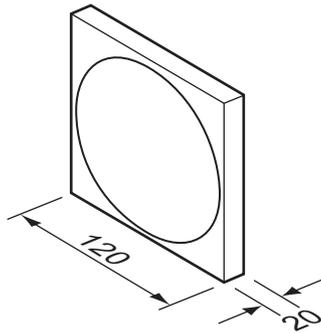
(iii) State a suitable thickness for the seat.

..... [1]

- (b) (i) Use notes and sketches to show how the front wheel could be secured to the steering column and allowed to move freely.

[3]

- (ii) Use notes and sketches to show how a wheel could be produced from a piece of solid wood **or** manufactured board as shown below.



[4]

(c) Use notes and sketches to design a wooden handlebar that could be fixed to the steering column.

Include the following details:

- the method of construction;
- shaping for comfort and grip.

(d) (i) Give **two** reasons why gloss paint would be a suitable finish for the tricycle. [6]

1 [1]

2 [1]

(ii) Give **two** reasons why the parts of the tricycle would be painted **before** they were assembled.

1 [1]

2 [1]

(iii) Complete the table below by describing the stages in preparing the wooden parts of the tricycle for a gloss paint finish.

Stages
Smooth surfaces using a medium grade of glasspaper
Apply gloss paint

[4]

12 Fig. 6 shows a desk tidy made from acrylic.

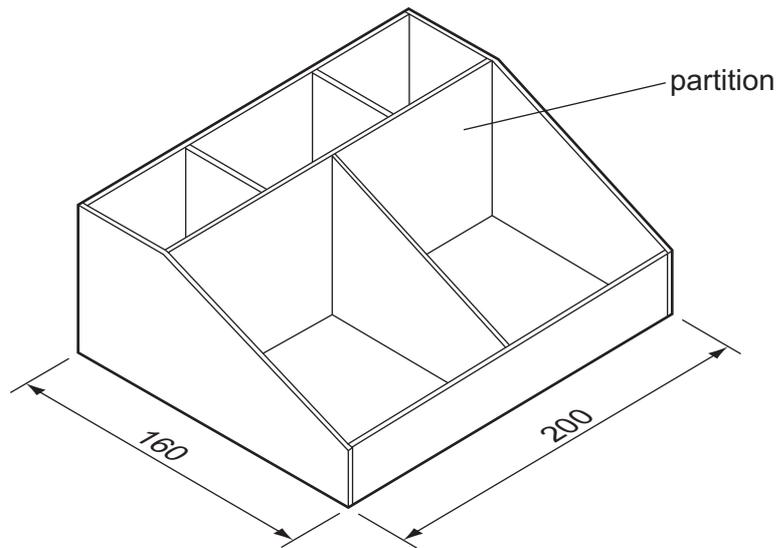


Fig. 6

(a) Give **one** reason why acrylic is a suitable material for the desk tidy.

..... [1]

(b) Fig. 7 shows the development (net) of the desk tidy marked out.

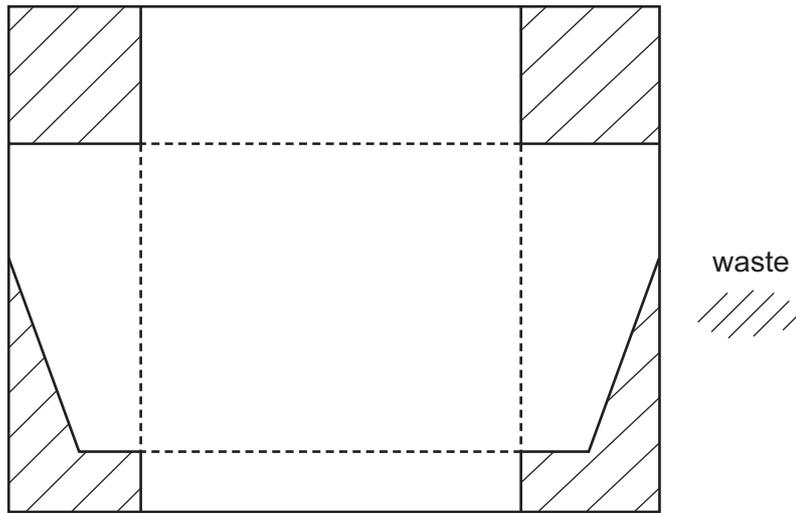


Fig. 7

(i) Name **two** marking out tools used to mark out the development (net) on acrylic sheet.

1 [1]

2 [1]

(ii) Use notes and sketches to describe how the waste material could be removed and the edges made flat and smooth.

[6]

(c) Use notes and sketches to show how the four sides of the development (net) could be bent to shape.

Include the following details:

- the method of heating the plastic;
- the use of jigs or formers;
- the means of holding the plastic in place while it cools.

[8]

(d) (i) Name a solvent that could be used to cement the partitions into the desk tidy as shown in Fig. 6.

..... [1]

(ii) State **one** safety factor that would need to be considered when using a solvent.

..... [1]

(e) Use notes and sketches to design a lid for the desk tidy that would keep the contents clean.

Include details showing how the lid would fit onto the desk tidy and how it could be opened and closed.

[6]

13 Fig. 8 shows an incomplete design for a bracket to hold a hi-fi speaker similar to that shown. The bracket must be capable of supporting different sizes of speaker.

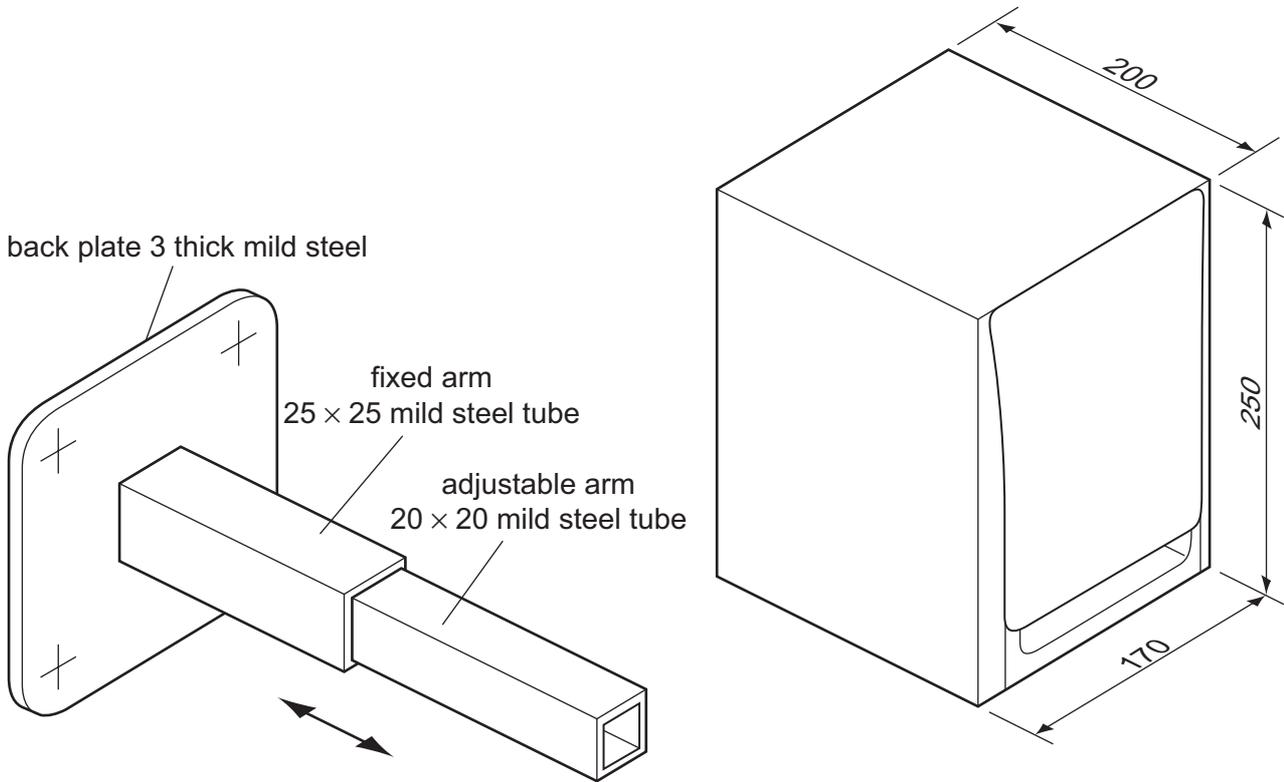


Fig. 8

(a) State **one** property of mild steel that makes it suitable for the bracket.

..... [1]

(b) Fig. 9 shows the back plate marked out before it is shaped and drilled.

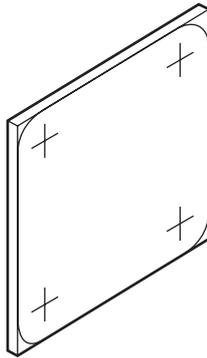


Fig. 9

(i) Name **two** tools used to mark out the centres for the holes before they are drilled.

1 [1]

2 [1]

(ii) Name the tool used to mark the radius for the corners.

..... [1]

(c) Fig. 10 shows one end of a length of mild steel tube after it has been sawn.

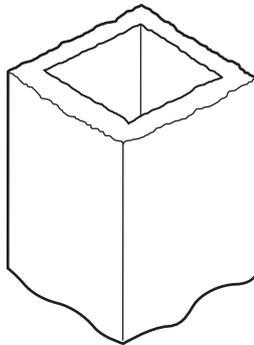


Fig. 10

Name the correct tool that would be used to:

(i) saw the mild steel; [1]

(ii) make the end of the tube flat and square. [1]

(d) The fixed arm will be brazed to the back plate.

(i) Complete the table below by giving details of the stages in brazing the fixed arm to the back plate.

Stages
Clean the joint
Leave to cool

[5]

(ii) Describe **two** safety precautions you would need to take when brazing.

1 [1]

2 [1]

(e) The bracket will be finished with paint.

(i) Describe how the mild steel would be cleaned before the paint is applied.

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

(ii) The paint could be applied by means of brush or spray.

Give **one** advantage for a brush finish and a spray finish.

Advantage for brush [1]

Advantage for spray [1]

(f) Add notes and sketches to Fig. 11 to complete the design of the bracket so that:

- the adjustable arm is capable of being locked in any position;
- the speaker is secured to the adjustable arm.

Include details of all materials, constructions, fittings and fixings you would use.

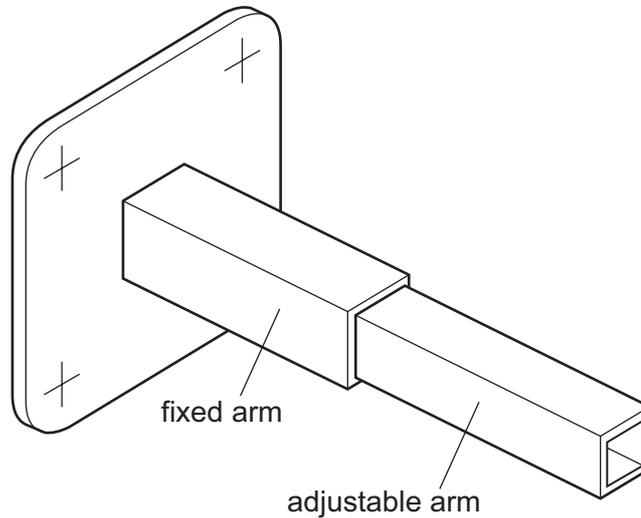


Fig. 11

[8]