Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1987927314

DESIGN AND TECHNOLOGY **0445/31**

Paper 3 Resistant Materials **May/June 2014**

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 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 **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.

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[Turn over

Section A

Answer **all** questions in this section.

1 Fig. 1 shows a step ladder.

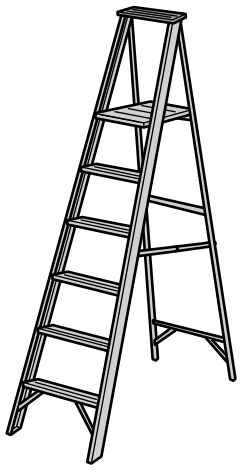


Fig. 1

(a) Name a suitable material for the step ladder.

..... [1]

(b) Give **one** reason for your choice.

..... [1]

2 Fig. 2 shows a coping saw being used to cut a curved shape in wood.

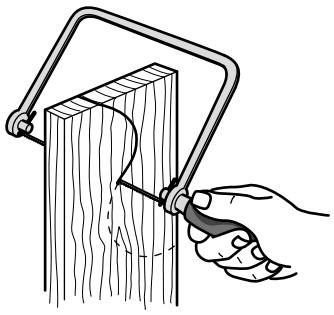


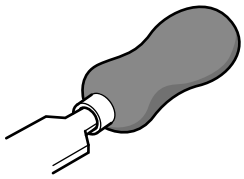
Fig. 2

Describe **two** checks that would need to be carried out before using the coping saw.

1 .....

2 ..... [2]

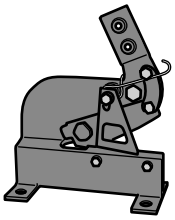
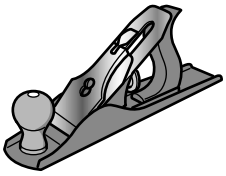
3 **(a)** Complete the drawing below to show a hand file.



[2]

(b) Label the safe edge on the hand file you have drawn. [1]

4 Complete the table below by naming each tool and giving a specific use.

Tool	Name	Specific use
		
		

[4]

5 Fig. 3 shows a milk container made from a plastic.

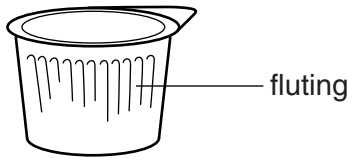


Fig. 3

(a) State a suitable method of manufacture for the milk container.

.....[1]

(b) Give **one** manufacturing reason for the tapered shape of the milk container.

.....[1]

(c) Give **one** reason for the fluting on the milk container.

.....[1]

6 Show on Fig. 4 **two** important anthropometric measurements that would be used to work out the size of a chair.

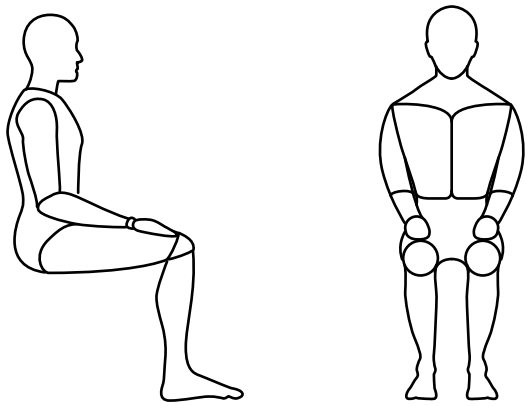


Fig. 4

[2]

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7 Fig. 5 shows sheet material with centres for three holes marked out, ready to be drilled.

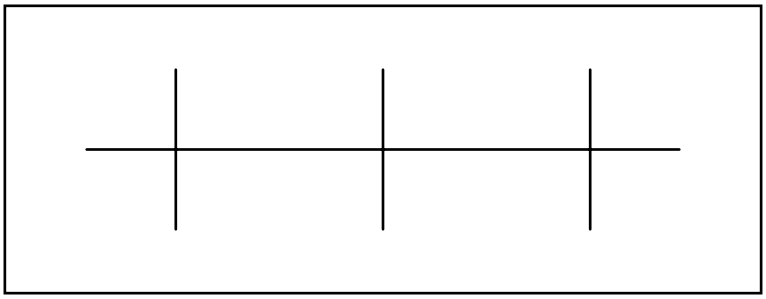


Fig. 5

Name the tool used to draw the lines on the sheet material when made from:

1 mm thick mild steel .....

3 mm thick acrylic .....[2]

8 Fig. 6 shows folding bars.

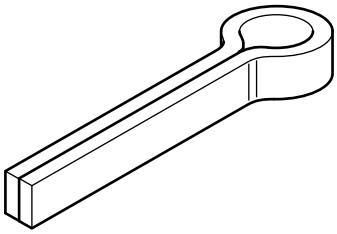


Fig. 6

Add to Fig. 6 to show a piece of sheet metal being bent to shape in the folding bars. [3]

9 Fig. 7 shows a student soldering electronic components.

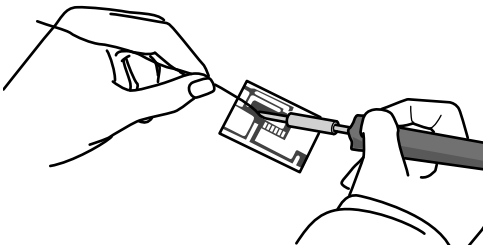


Fig. 7

(a) Name the type of solder being used.

.....[1]

(b) Give **one** other example where this type of solder could be used.

.....[1]

10 Fig. 8 shows two sun loungers used in a garden.

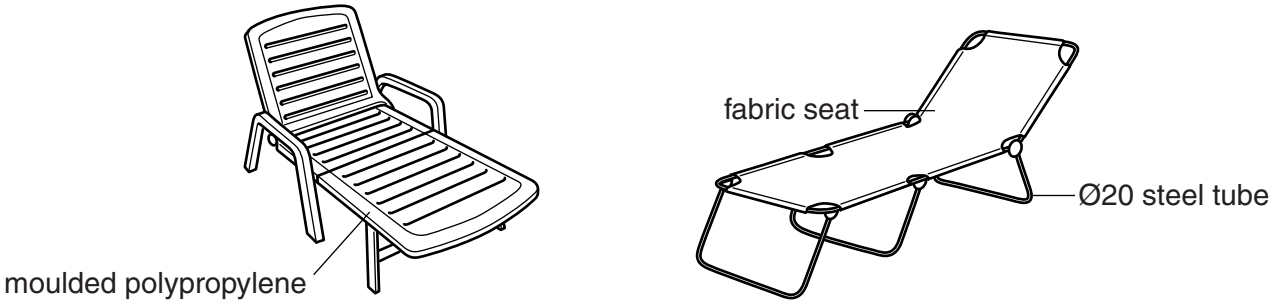


Fig. 8

Give **two** advantages of sun lounger **A** over sun lounger **B**.

1 .....

2 .....[2]

Section B

Answer **one** question from this section.

11 Fig. 9 shows views of a towel holder made from hardwood and non-ferrous metal.

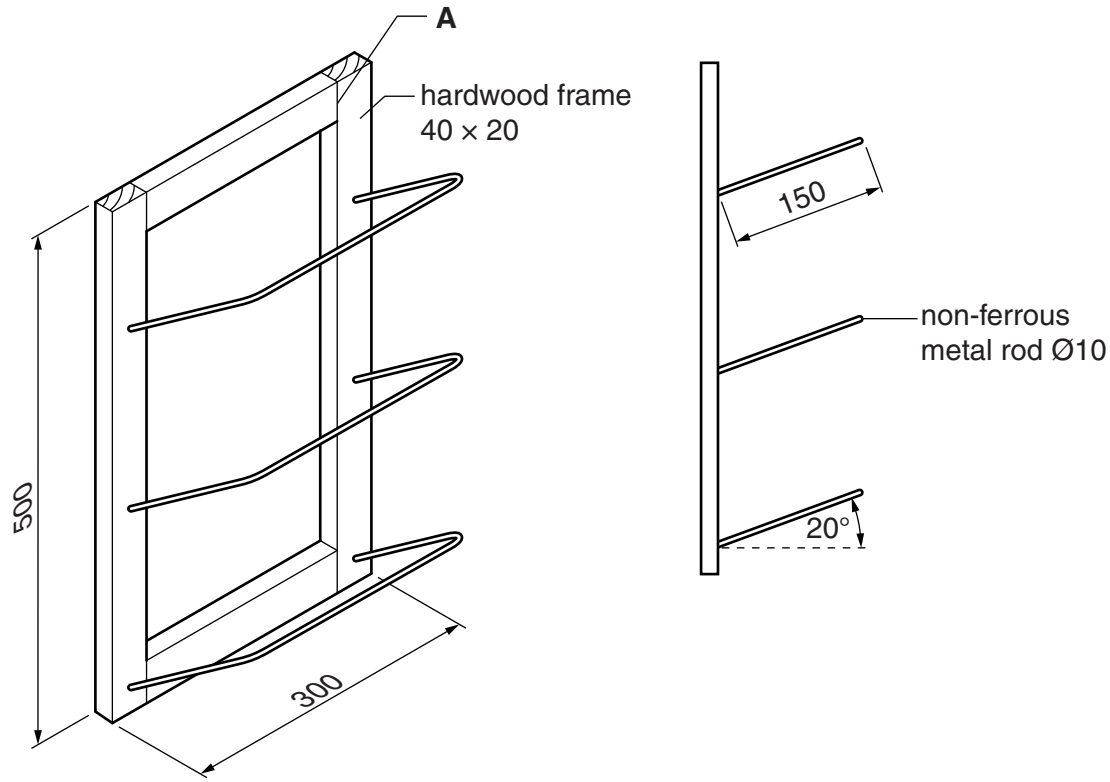


Fig. 9

(a) Sketch and name a suitable corner joint at **A**.

Name of joint.....[4]

(b) The four sides of the hardwood frame will be glued and clamped together.

(i) Name a suitable glue and state the time it will take to set.

Glue.....

Time to set .....[2]

(ii) Name the type of cramps used.

.....[1]

(iii) Describe **two** checks that would be made when clamping the frame.

1 .....

2 .....[2]

(c) Holes will be drilled into the sides of the frame to take the Ø10 metal rod.
The holes will need to be drilled at an angle of 20°.
Use sketches and notes to show how the holes could be drilled safely and accurately using a bench-mounted drill.

[3]

(d) Use sketches and notes to show a bending jig that could be used to make sure that the bends in all **three** metal rods are the same.

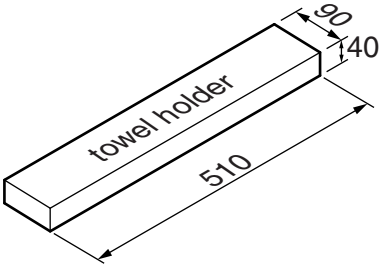
[4]

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(e) Use sketches and notes to show how the towel holder could be fitted against a wall without screwing through the front of the frame. Include details of sizes and materials used.

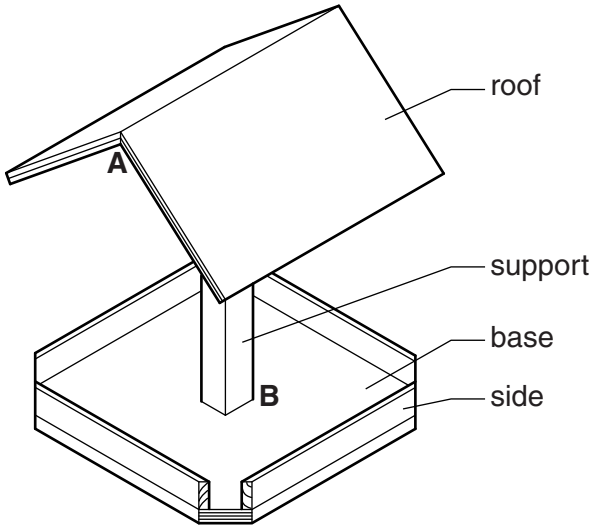
[4]

(f) The towel holder could be sold as flat-pack for self-assembly.
Use sketches and notes to show how the design of the hardwood frame and Ø10 metal rods could be modified so that they would fit into the box shown below and sent to customers.
Include **all** constructional details.



[5]

12 Fig. 10 shows details of a bird table.



Part	Number required	Length × width × thickness	Material
Base	1	250 × 250 × 12	Plywood
Side	4	200 × 25 × 12	Pine
Support	1	300 × 30 × 30	Pine
Roof	2	250 × 200 × 9	Plywood

Fig. 10

(a) Give **two** benefits of making a card model of the bird table before making it from wood.

1.....

2.....[2]

(b) Sketch and name a suitable method of joining the support to the base at **B**.

Name of method .....[4]

(c) The roof is made in two halves that are joined together at **A** as shown in Fig. 10.
Fig. 11 shows details of one half of the roof marked out ready to be shaped to make the joint.

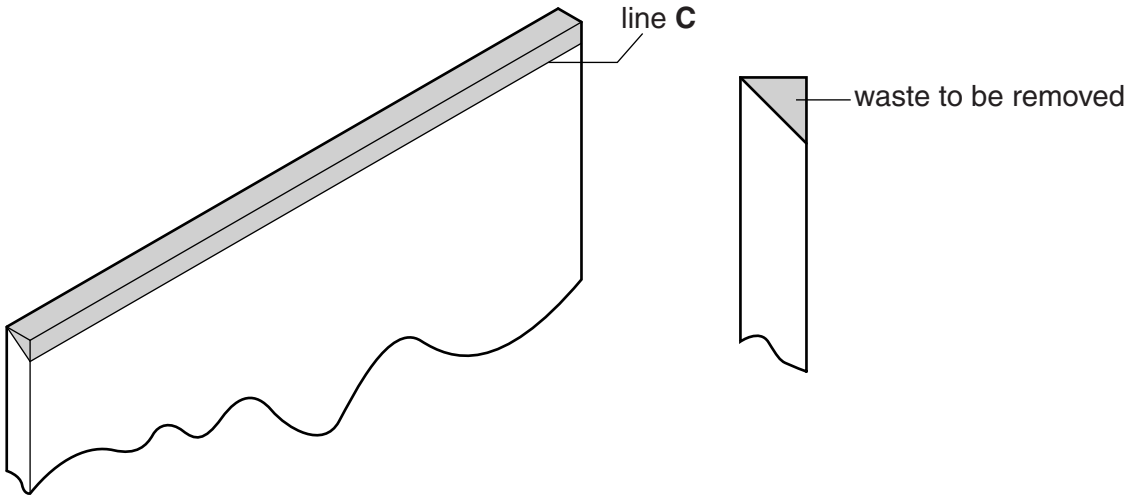


Fig. 11

(i) Give **two** advantages of using a cutting gauge rather than a pencil and try square to mark out line **C**.

1 .....

2 .....[2]

(ii) Use sketches and notes to describe how the waste could be removed.
Name all the tools and equipment used.

[3]

(d) Fig. 12 shows the base of the bird table marked out ready to be cut to shape.

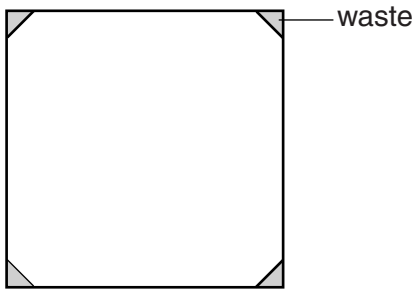


Fig. 12

Complete the table below by naming **one** tool that could be used for each process.

Process	Tools/equipment used
Mark out	
Saw off waste	
Make sawn edges smooth	

[3]

(e) The sides will be glued and nailed to the base.

(i) Name a suitable type of nail that could be used.

.....[1]

(ii) Name a suitable glue to join the sides to the base.

.....[1]

(iii) Give **one** reason why the sides fitted to the base have gaps in the corners.

.....[1]

(f) Describe **two** problems when designing products for outdoor use and how each problem may be overcome.

Problem 1 .....

Overcome .....

Problem 2 .....

Overcome .....[4]

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(g) Fig. 13 shows a length of pine used to make the support for the roof.

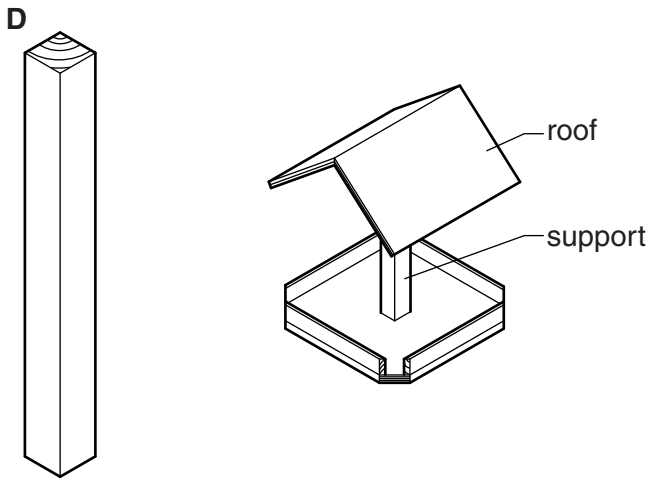


Fig. 13

Modifications will need to be made to the support at end **D** so that it can be joined securely to the roof.
Use sketches and notes to show how the support and roof could be joined permanently.
Include details of materials and constructions used.

[4]

13 Fig. 14 shows a combined photo frame and coat hook made from 4mm thick acrylic. It will be wall-mounted in a child's bedroom.

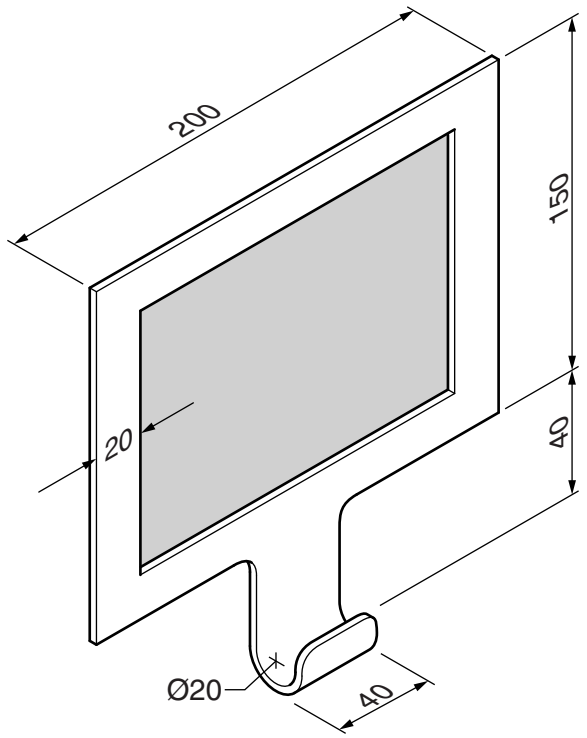


Fig. 14

(a) Fig. 15 shows the acrylic sheet from which the photo frame and coat hook will be cut.

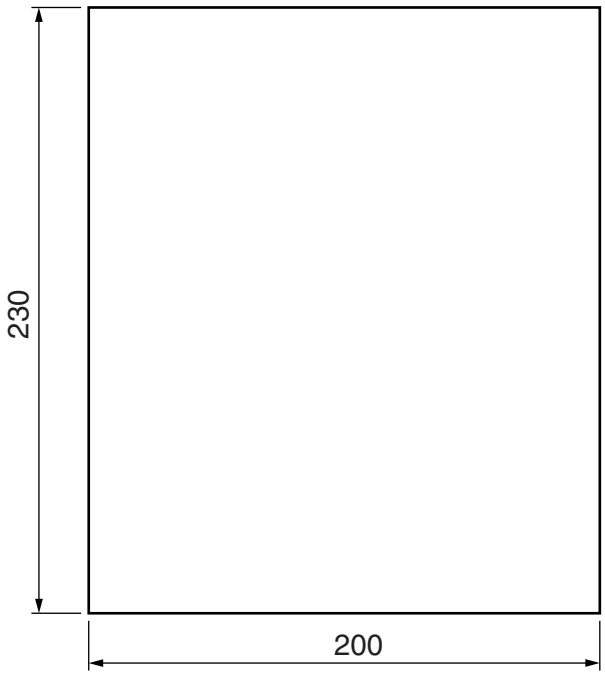


Fig. 15

(i) Draw on Fig. 15 the development (net) of the photo frame and coat hook. Include the cut out shape for the photo. [5]

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(ii) Give **two** benefits of using a template to mark out the development (net).

1 .....

2 .....[2]

(b) When working with acrylic there is a danger that it could crack.
Use sketches and notes to show how this can be prevented when:

(i) sawing in a vice;

[3]

(ii) drilling on a bench-mounted drilling machine.

[3]

(c) When working with acrylic sheet, the surface can become easily scratched.
Describe how scratches can be removed from the surface of acrylic sheet.

.....

.....

.....[2]

(d) Use sketches and notes to show how the coat hook would be heated and bent to shape.

[4]

(e) Use sketches and notes to show how a photograph could be supported behind the photo frame. Your design must allow the photo to be replaced quickly and easily.
Include details of sizes and constructions.

[6]

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