



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER



**DESIGN AND TECHNOLOGY**

**0445/31**

Paper 3 Resistant Materials

**May/June 2015**

**1 hour**

Candidates answer on the Question Paper.

No Additional Materials are required.

**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.

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.

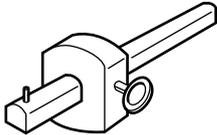
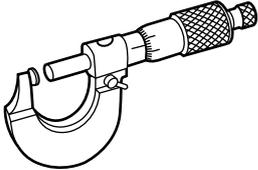
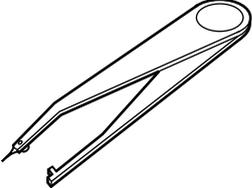
The total of the marks for this paper is 50.

This document consists of **14** printed pages and **2** blank pages.

**Section A**

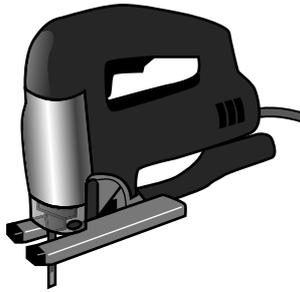
Answer **all** questions in this section.

1 Complete the table below by naming each tool.

Tool	Name
	
	
	

[3]

2 Fig. 1 shows a jigsaw. The jigsaw has a blade that can be replaced.



**Fig. 1**

Give **two** benefits of using a saw that has replaceable blades.

- 1 .....
- 2 ..... [2]

3 From the list of materials shown below underline **two** composite materials.

- aluminium      Kevlar®      polystyrene      stainless steel      glass reinforced plastic

[2]

4 Fig. 2 shows a rod that will be joined permanently to a base.

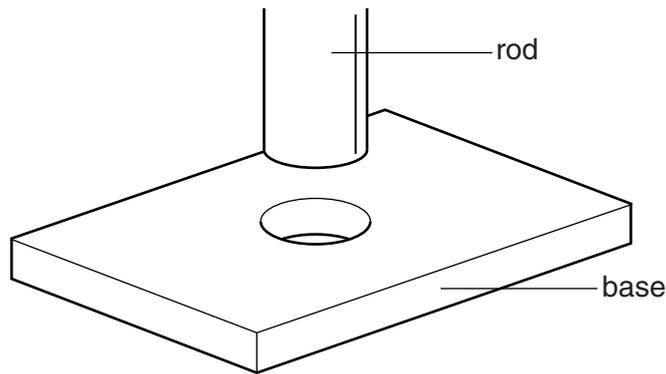


Fig. 2

State a method of joining the rod to the base permanently when both parts are made from:

- (a) mild steel .....
- (b) acrylic ..... [2]

5 Fig. 3 shows two wood joints labelled A and B.

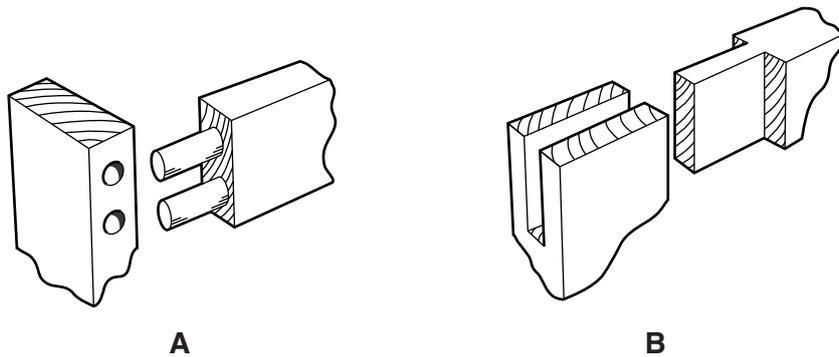


Fig. 3

(a) Name each of the wood joints labelled A and B.

- A .....
- B ..... [2]

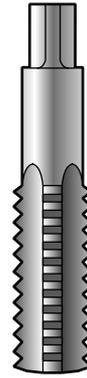
(b) Give **one** reason why joint B is stronger than joint A when they are glued.

..... [1]

6 (a) Name each of the tools labelled **A** and **B** shown below.



**A**



**B**

**A** .....

**B** .....[2]

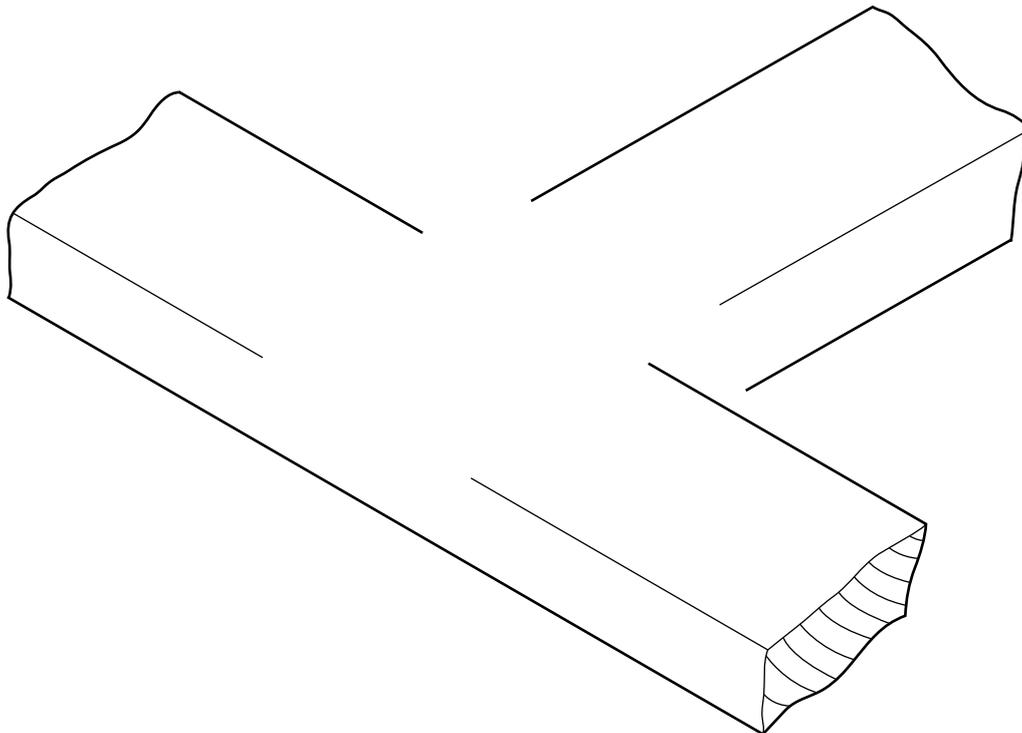
(b) State the purpose of tool **A**.

.....[1]

(c) State the purpose of tool **B**.

.....[1]

7 Complete the drawing below to show a tee halving joint.



[3]

8 Fig. 4 shows a small table made from hardwood.

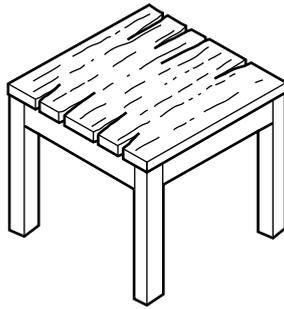


Fig. 4

Give **two** possible reasons why the table top has split.

- 1 .....
- 2 ..... [2]

9 Fig. 5 shows a palm sander to be used on wood.

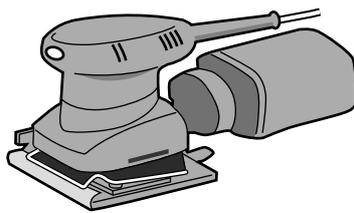


Fig. 5

Describe **two** ways by which the designer has considered ergonomics in the design of the palm sander.

- 1 .....
- 2 ..... [2]

10 Fig. 6 shows a symbol found on a product made from a plastic.



HDPE

Fig. 6

(a) Name the plastic.

..... [1]

(b) State what is meant by the arrowed lines around the number 2.

..... [1]

## Section B

Answer **one** question in this section.

- 11 Fig. 7 shows details of a variety of wooden shapes and pegs that are part of a child's construction kit. The construction kit will be made in a school workshop.

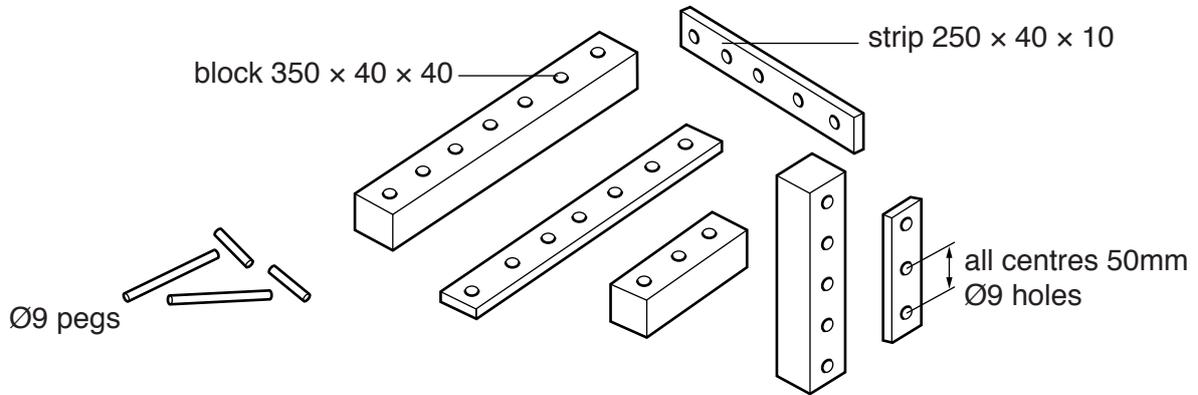


Fig. 7

- (a) Fig. 8 shows a length of wood from which the strips are made.

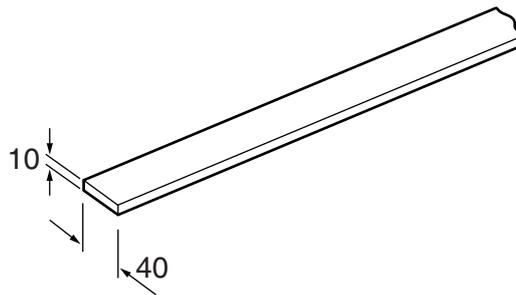


Fig. 8

Use sketches and notes to show the stages in producing a **one-off** strip 250 mm long complete with 9 mm diameter holes drilled. Name all the tools and equipment used.

[5]

- (b) A drilling jig would be used to speed up batch production of the strips and blocks. Use sketches and notes to show a design for a jig used in the drilling of 9 mm holes. Name the materials used to make the jig.

[7]

- (c) The wooden strips and blocks will have a finish applied to them.

- (i) Give **one** advantage of applying a finish to the strips and blocks.

.....

- (ii) Give **one** disadvantage of applying a finish to the strips and blocks.

.....[2]

- (d) The construction kit needs a set of six identical wheels.  
Use sketches and notes to show how **six** wheels could be produced.  
Include the following details:
- specific materials;
  - processes used;
  - two important sizes.

[8]

- (e) The wooden pegs, used to connect the strips and blocks, are made from round section wood.  
Give the correct name for round section wood.

.....[1]

- (f) Many children’s toys are made from plastic.  
Give **two** advantages of making children’s toys from plastic rather than from wood.

1 .....

2 .....[2]

12 Fig. 9 shows a desk tidy made from 4 mm thick acrylic.

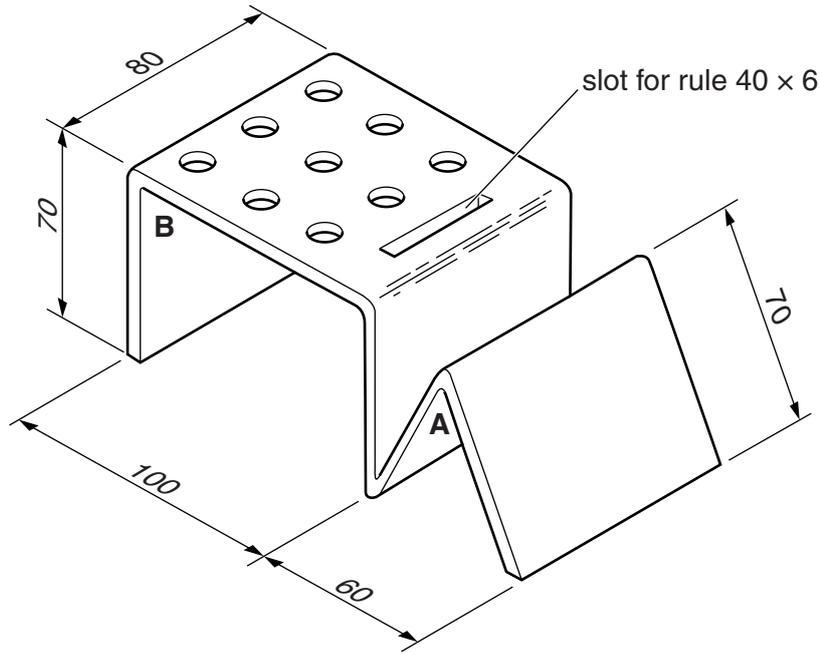
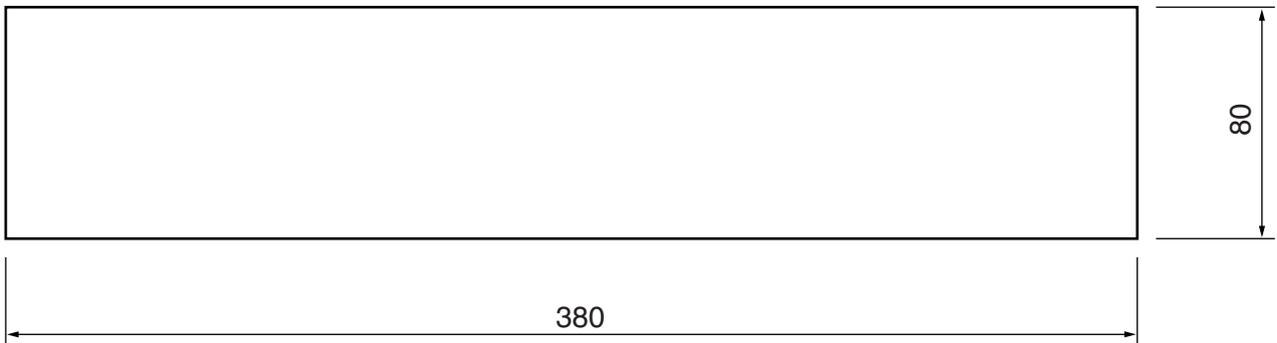


Fig. 9

- (a) Complete the development (net) of the desk tidy below to show the bend lines. Do **not** include the holes or slot.



[4]

- (b) Complete the table below by giving details of the stages involved in finishing the sawn edges of the acrylic to a high quality.

Stage	Process
1	<i>Draw file edges, holding the acrylic in a vice.</i>
2	
3	
4	

[3]

(c) (i) Use sketches and notes to show how the slot could be cut out and the edges made smooth.

[3]

(ii) State **two** precautions you would take to prevent the acrylic from cracking when drilling the holes.

1 .....

2 .....[2]

(d) Use sketches and notes to show how the bend at **A** in Fig. 9 could be produced.

Include:

- the method of softening the acrylic;
- the use of a former;
- the method of retaining the shape while the acrylic cools.

[4]

- (e) When the desk tidy shown in Fig. 9 is picked up and moved around, the pens, pencils and rule fall out.  
Use sketches and notes to show a modification to the desk tidy to overcome this problem.  
Include details of materials and constructions used.

[4]

- (f) The desk tidy shown in Fig. 9 could be made from 1 mm thick aluminium sheet.  
Use sketches and notes to show how the bend at **B** could be produced when the desk tidy is made from 1 mm thick aluminium sheet.  
Name the tools and equipment used.

[3]

- (g) Both the acrylic and aluminium desk tidies will be self-finished.  
Explain what is meant by the term 'self-finished'.

.....

.....

.....[2]

13 Fig. 10 shows details of a child’s puzzle and the tray in which the puzzle is placed. The puzzle is made from six pieces of MDF and the tray is made from plywood.

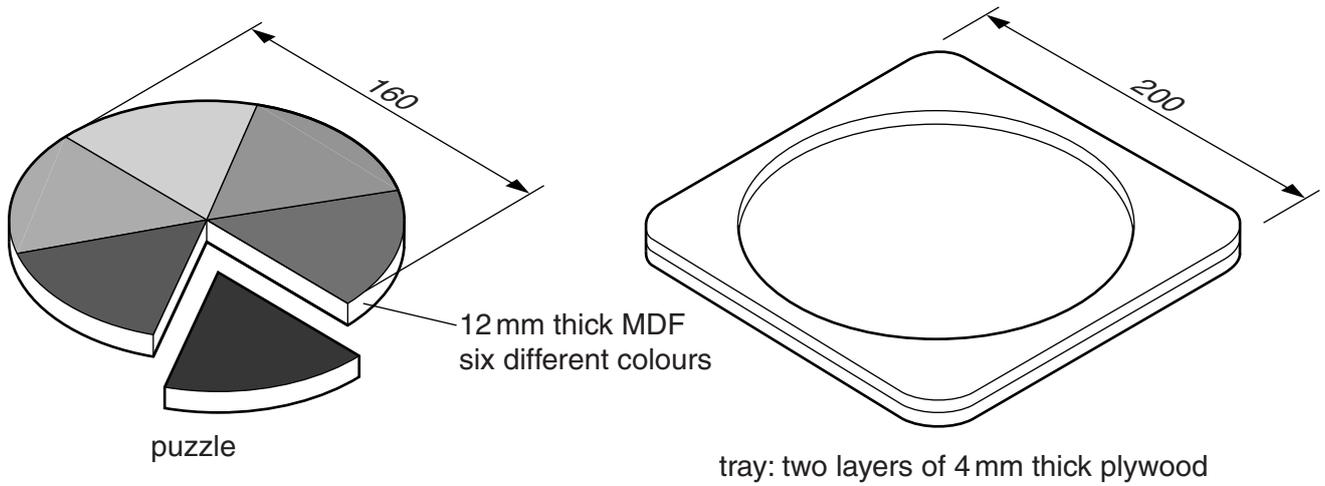


Fig. 10

(a) Give **two** advantages of using MDF rather than plywood for the puzzle.

- 1 .....
- 2 ..... [2]

(b) Describe **three** ways in which the designer has made the puzzle suitable for young children.

- 1 .....
- 2 .....
- 3 ..... [3]

(c) The tray shown in Fig. 10 is made from two pieces of 4 mm plywood glued together.

(i) Use sketches and notes to explain why the construction of plywood makes it more suitable for the tray than solid wood.

[3]

- (ii) Use sketches and notes to show how the hole in the top piece of plywood could be cut out and the sides of the hole made smooth.

[5]

- (iii) Use sketches and notes to show how the top and bottom pieces of plywood could be glued and clamped together.  
Name a suitable adhesive and the type of cramps used.

[4]

- (iv) The tray could be made from vacuum formed plastic.  
Give **two** advantages of producing the tray from vacuum formed plastic rather than from plywood.

1 .....

2 ..... [2]

(d) The puzzle could be produced using CAD/CAM.  
Complete the abbreviations CAD/CAM below.

Computer **A**ided **D** .....

Computer **A**ided **M** ..... [2]

(e) Describe **two** quality control checks that would be carried out **during** the manufacture of the puzzle and/or the tray.

1 .....

2 ..... [2]

(f) Give **two** reasons why the use of manufactured boards such as MDF and plywood, rather than plastics, could be considered good for the environment.

1 .....

.....

2 .....

..... [2]



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