



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

CANDIDATE  
NAME

CENTRE  
NUMBER

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

CANDIDATE  
NUMBER

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|



**DESIGN AND TECHNOLOGY**

**0445/33**

Paper 3 Resistant Materials

**October/November 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 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.

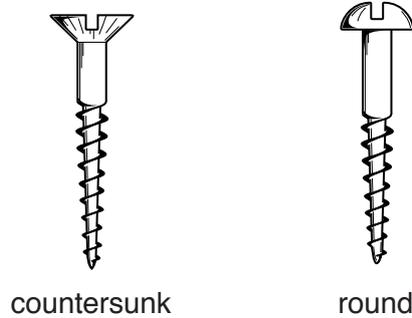
The total of the marks for this paper is 50.

This document consists of **17** printed pages and **3** blank pages.

**Section A**

Answer **all** questions in this section.

1 Fig. 1 shows a countersunk head woodscrew and a round head woodscrew.



**Fig. 1**

(a) Show clearly on Fig. 1:

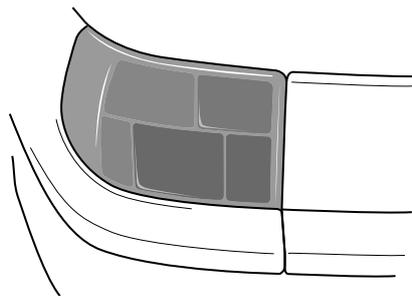
(i) the length of the countersunk head woodscrew;

(ii) the length of the round head woodscrew. [2]

(b) State what is meant by the term 'gauge' when choosing a woodscrew.

..... [1]

2 Fig. 2 shows part of a car rear light unit.



**Fig. 2**

(a) Name a suitable plastic for the rear light unit.

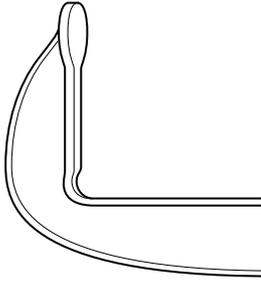
..... [1]

(b) Give **two** properties of the plastic that make it suitable for the rear light unit.

1 .....

2 ..... [2]

3 Complete the drawing below to show a G cramp.



[2]

4 Fig. 3 shows two lengths of wood, **A** and **B**. Each piece is 100 mm long.

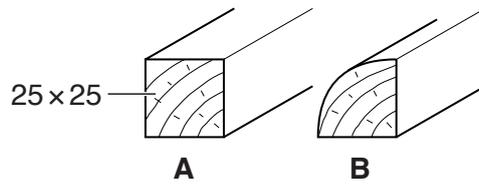


Fig. 3

Describe how you would produce the shape shown in length **B** from the square section shape **A**.

.....

.....

..... [2]

5 Fig. 4 shows food packaging made from plastic.

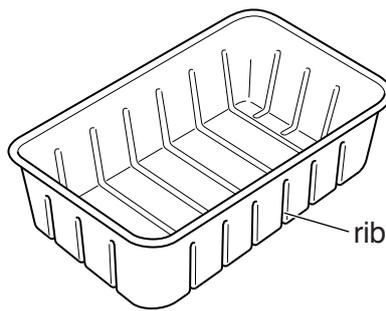


Fig. 4

(a) Name the process used to make the food packaging.

..... [1]

(b) Give **one** reason why ribs are used in the design of the food packaging.

..... [1]

6 Fig. 5 shows a metalworking process.

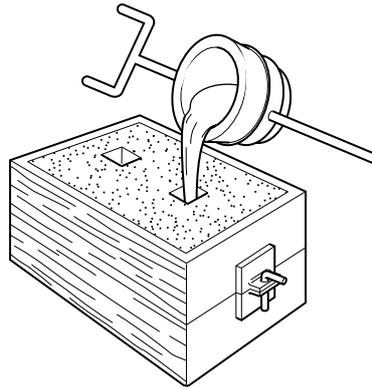


Fig. 5

(a) Name the process shown in Fig. 5.

..... [1]

(b) Name a metal commonly used for the process shown in Fig. 5.

..... [1]

7 Fig. 6 shows views of a student making a model of a tool handle.

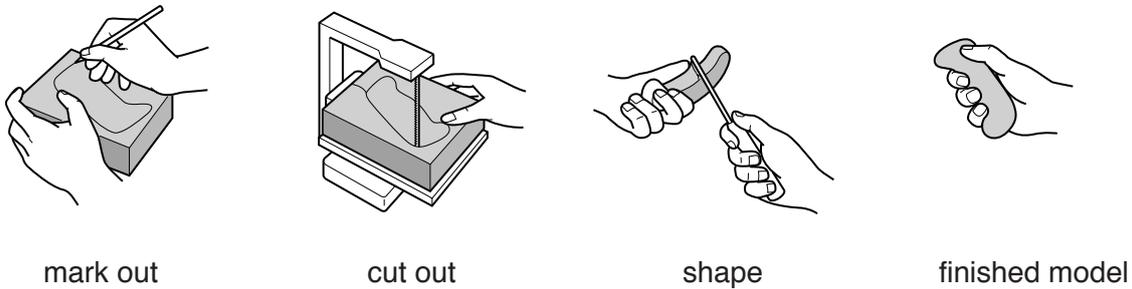


Fig. 6

(a) Name a suitable plastic that could be used to make the model of the tool handle shown in Fig. 6.

..... [1]

(b) The model of the tool handle could also be made from the 'smart' material, polymorph. Give **two** advantages of using polymorph for the tool handle rather than a plastic material.

1 .....

2 ..... [2]

- 8 Fig. 7 shows an incomplete drawing of the side view of the jaws of a machine vice used to hold metal while it is drilled.

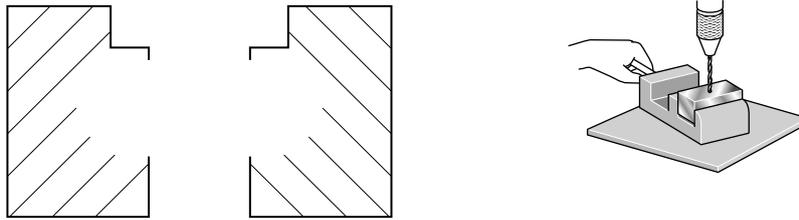


Fig. 7

Complete the drawing to show details of the machine vice jaws.

[2]

- 9 Fig. 8 shows a bending jig and metal rod that has been bent to shape.

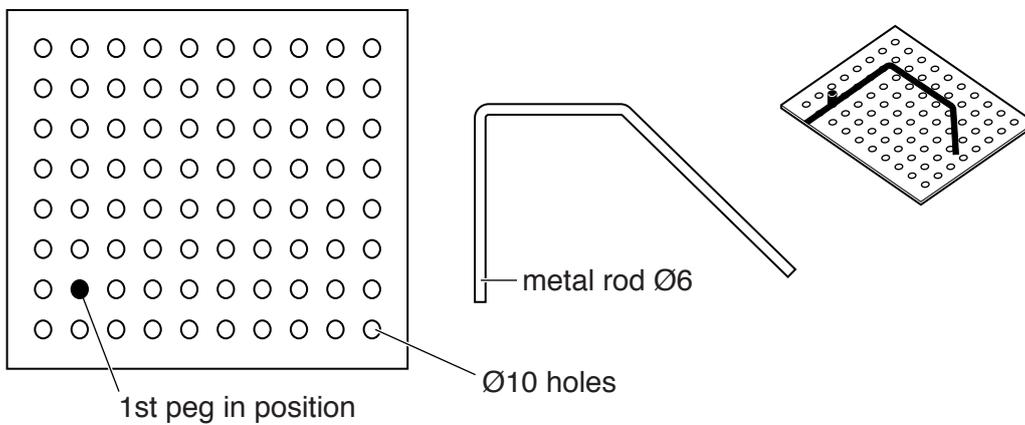


Fig. 8

Draw on the base in Fig. 8 to show the positions of **three** additional Ø10 metal pegs that would enable the Ø6 metal rod to be bent to the shape shown in Fig. 8.

[3]

- 10 Fig. 9 shows metal being hard (silver) soldered. Name the items of equipment **A**, **B** and **C** in Fig. 9.

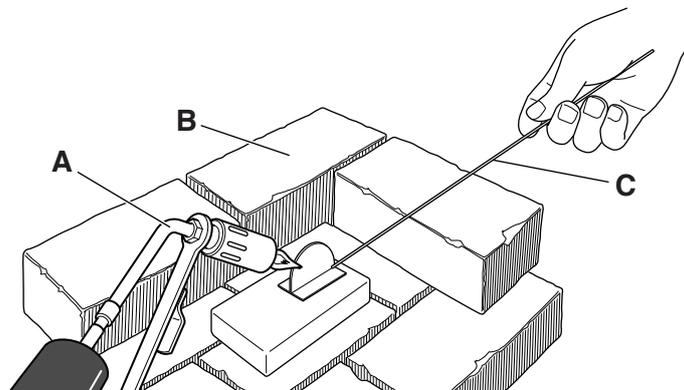


Fig. 9

A .....

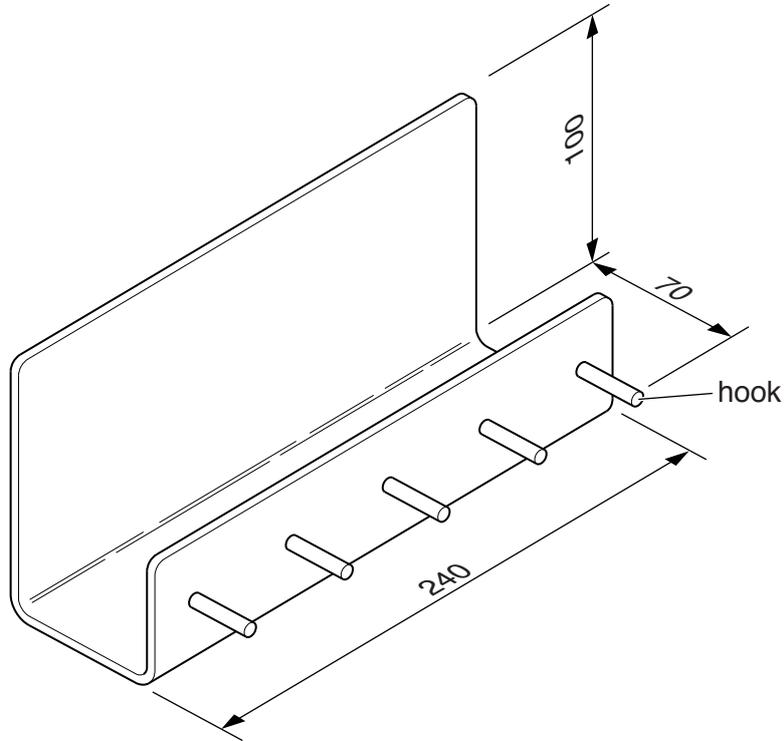
B .....

C ..... [3]

**Section B**

Answer **one** question in this section.

- 11 Fig. 10 shows a basic design for a wall-mounted letter and key rack made from 4 mm thick acrylic sheet.



**Fig. 10**

- (a) Fig. 11 shows the development (net) of the letter and key rack marked out on a sheet of acrylic.



**Fig. 11**

Name **two** tools used to mark out the development (net).

1 .....

2 ..... [2]

(b) When drilling holes in acrylic sheet there is a danger that the acrylic could crack. State **two** precautions that you could take to reduce the risk of this happening.

1 .....

2 ..... [2]

(c) Use sketches and notes to show how the development (net) of the letter and key rack would be heated and bent to shape.

[3]

(d) The basic shape of the letter and key rack could be produced by the extrusion process. Fig. 12 shows an extrusion moulding machine. Add notes to Fig. 12 to describe the process of extrusion.

[4]

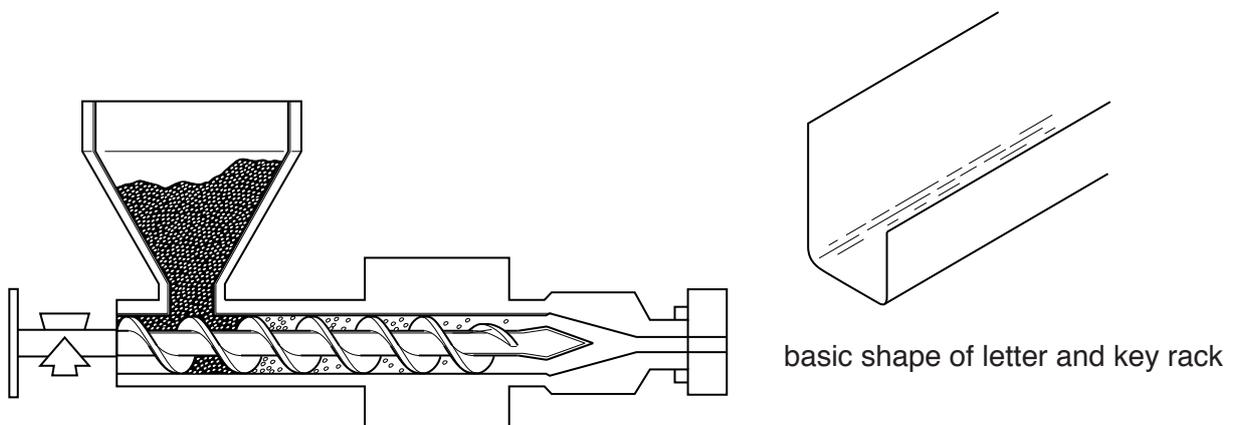
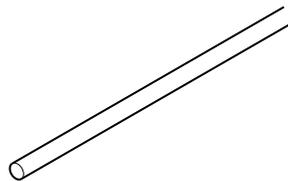


Fig. 12

- (e) Use sketches and notes to show how a partition could be added along the length of the base of the letter and key rack so that letters could be kept separate. Include all constructional details and sizes.

[5]

- (f) Fig. 13 shows a length of  $\varnothing 5$  acrylic rod from which the five hooks will be made.



**Fig. 13**

Use sketches and notes to show how:

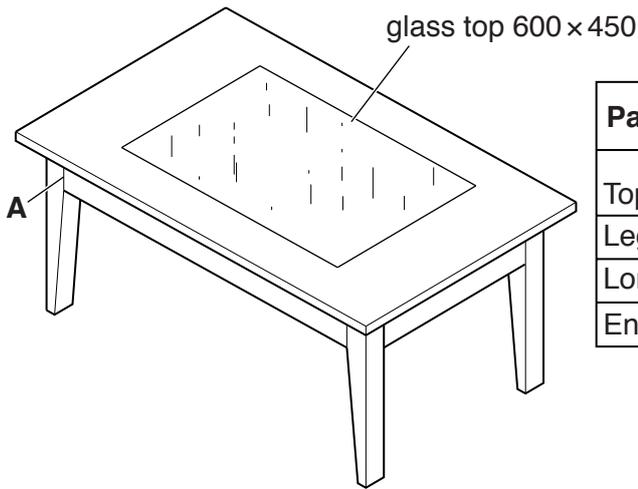
- the hooks would be sawn to length;
- the sawn ends would be made smooth;
- the hooks would be fixed permanently in the  $\varnothing 5$  holes.

[5]

- (g) The letter and key rack will be wall-mounted.  
Use sketches and notes to show a modification to the design so that it could be positioned against a wall. Include all constructional details and sizes.  
Holes must **not** be visible when viewed from the front.

[4]

12 Fig. 14 shows a coffee table. A cutting list gives details of sizes of each of its parts.



| Part       | Number required | Length x Width x Thickness | Material           |
|------------|-----------------|----------------------------|--------------------|
| Top        | 1               | 1000 x 600 x 20            | Manufactured board |
| Legs       | 4               | 450 x 50 x 50              | Hardwood           |
| Long rails | 2               | 800 x 80 x 20              | Hardwood           |
| End rails  | 2               | 500 x 80 x 20              | Hardwood           |

Fig. 14

(a) Give **two** characteristics that you would expect to find in hardwoods used to make high quality furniture.

1 .....

2 ..... [2]

(b) Give **one** reason why the hardwood used to make the coffee table must be seasoned.

..... [1]

(c) (i) Give **one** reason why the edges of the manufactured board table top would need to be covered with a lipping.

..... [1]

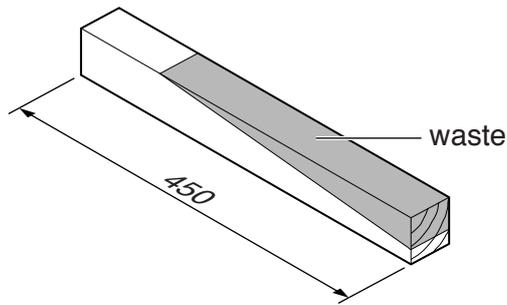
(ii) Describe **one** type of lipping that could be applied to the edge of the manufactured board.

..... [1]

(d) Sketch and name a suitable joint at **A** in Fig. 14

[4]

(e) Fig. 15 shows one leg marked out ready to be shaped.



**Fig. 15**

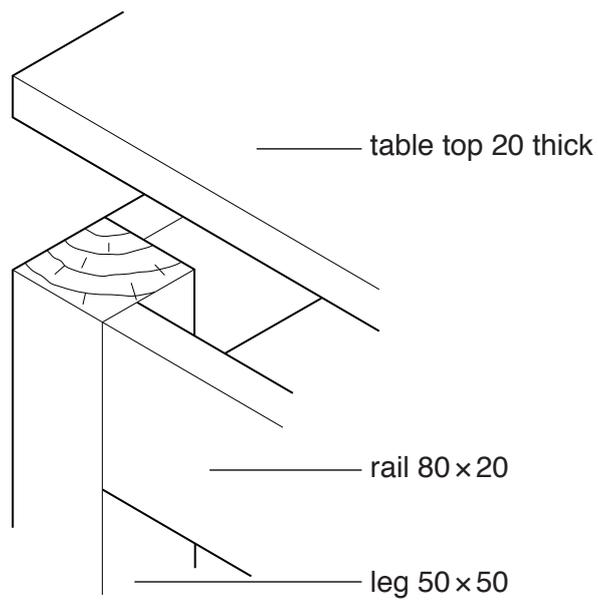
(i) Name a plane that could be used to remove the waste.

..... [1]

(ii) Use sketches and notes to show how the leg would be held in a vice so that the waste could be planed off.

[2]

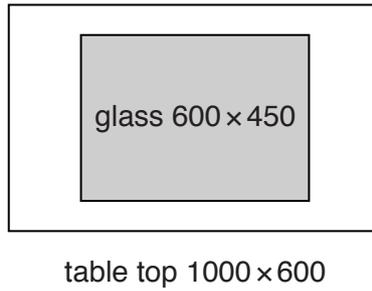
(f) Fig. 16 shows one corner of the coffee table with details of a leg, rails and table top.



**Fig. 16**

Use sketches and notes to show how the table top could be secured to the rails.

(g) Fig. 17 shows the area of the table top to be removed to allow for the 6 mm thick glass insert.



**Fig. 17**

(i) Use sketches and notes to show how the waste could be removed and the edges made flat and smooth.

[4]

(ii) Use sketches and notes to show how the 6 mm thick glass could be supported inside the table top. Include details of constructions and sizes.

[3]

(h) Explain how the coffee table shown in Fig. 14 could be considered to be a product that is environmentally friendly.

.....

.....

..... [2]

13 Fig. 18 shows a DVD rack made from 1 mm thick sheet metal.

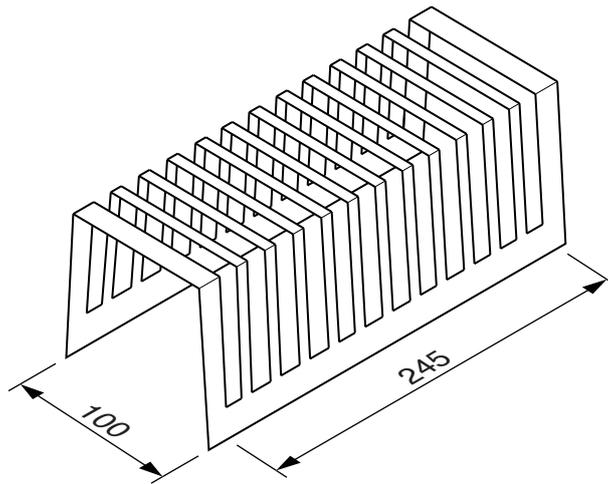
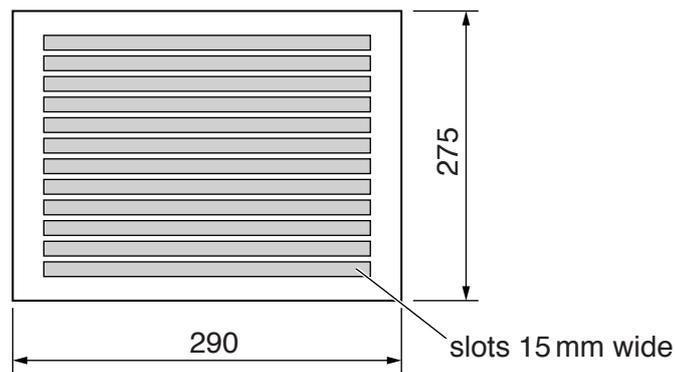


Fig. 18

(a) (i) Name **two** tools used to mark out the slots on the sheet metal shown below.



1 .....

2 ..... [2]

(ii) Use sketches and notes to show how **one** slot could be cut out and the edges made flat and smooth. Name all the tools and equipment used.

(b) The DVD rack could be made from mild steel or aluminium.

(i) Name a suitable applied finish for a DVD rack made from mild steel.

..... [1]

(ii) Describe how you could finish the DVD rack when made from aluminium without applying an additional finish.

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

(c) Use sketches and notes to show how the sheet metal could be bent to shape. Name the tools and equipment used.

[4]

(d) As the user's collection of DVDs increases an additional DVD rack is needed. Use sketches and notes to show how the DVD rack in Fig. 18 could be modified so that an identical DVD rack could be connected to either end of it quickly and easily. Include details of materials used and sizes.

[4]

(e) There is a danger that the edges of the DVD rack could cause scratches when placed on a polished surface. Use sketches and notes to show a design modification to the DVD rack to prevent this. Include details of materials and constructions used.

[4]

(f) Give **one** reason why the DVD rack could be considered to be a product with a limited lifetime.

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





**BLANK PAGE**

---

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at [www.cie.org.uk](http://www.cie.org.uk) after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.