



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

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**DESIGN AND TECHNOLOGY**

**0445/31**

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.

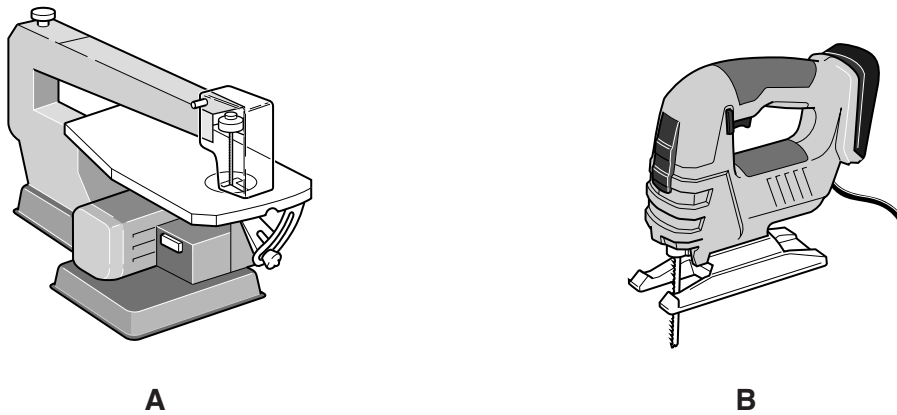
The total of the marks for this paper is 50.

This document consists of **16** printed pages.

**Section A**

Answer **all** questions in this section.

1 Fig. 1 shows two machine saws.



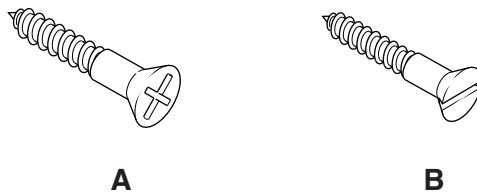
**Fig. 1**

Name each machine saw labelled **A** and **B**.

**A** .....

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

2 Fig. 2 shows two screws with different slots.



**Fig. 2**

Name the types of slot shown in screw **A** and screw **B**.

**A** .....

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

3 A list of plastics is given below.

**acrylic**

**polyester resin**

**epoxy resin**

**polypropylene**

Select a plastic from the list that:

(a) can be used with glass fibre;

.....

(b) is used as an adhesive.

..... [2]

4 Fig. 3 shows part of a process used to join pieces of metal permanently.

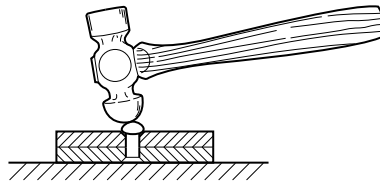


Fig. 3

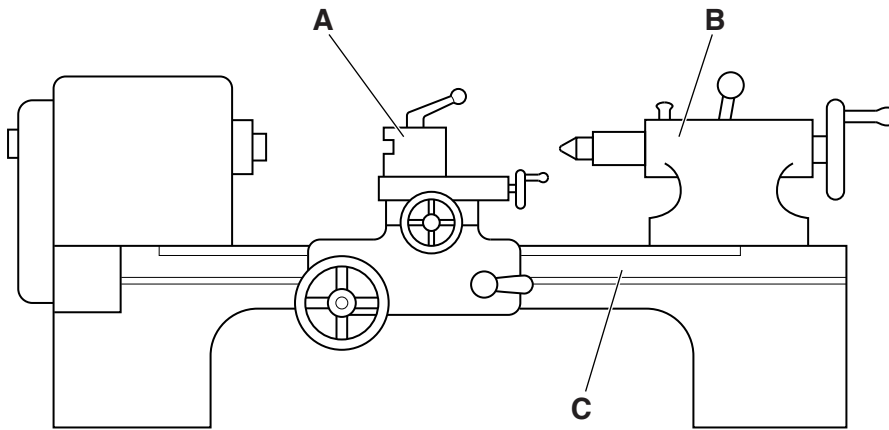
(a) Name the process shown in Fig. 3.

.....

(b) Name **one** other method of joining pieces of metal permanently.

..... [2]

5 Name the parts **A**, **B** and **C** of the centre lathe shown below.

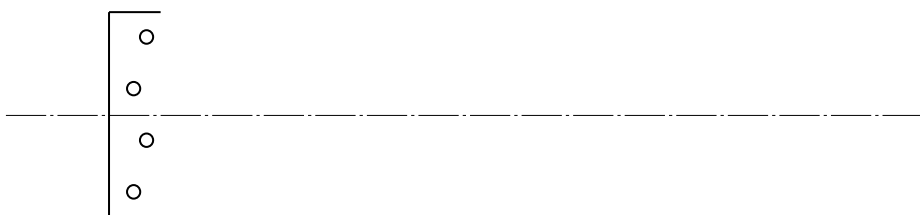


A .....

B .....

C ..... [3]

6 Complete the drawing below to show a tee hinge.



[2]

7 Fig. 4 shows a tennis racquet made from carbon fibre reinforced plastic (CFRP).

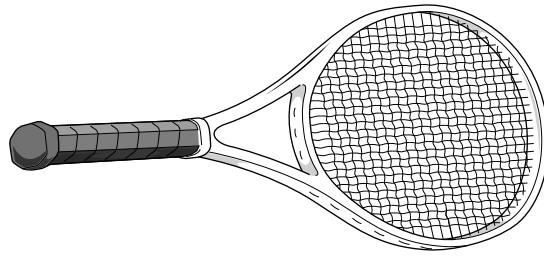
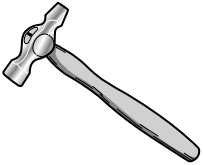



Fig. 4

Give **two** properties of carbon fibre reinforced plastic (CFRP) that make it suitable for a tennis racquet.

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

8 Complete the table below by giving a specific name and a different specific use for each hammer.

Hammer	Specific name	Specific use
		
		

[4]

9 Fig. 5 shows a cross-sectional view of an injection moulding machine in use.

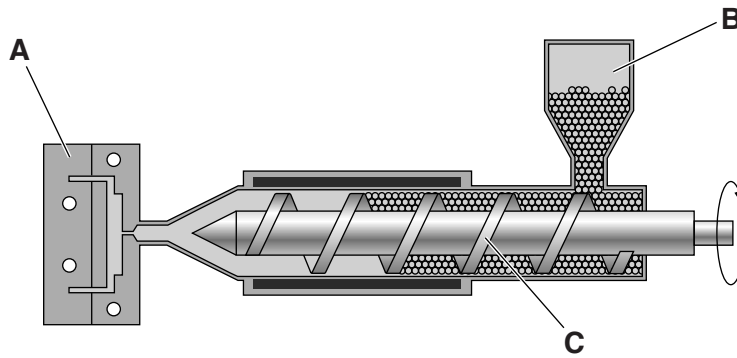


Fig. 5

Name the parts **A**, **B** and **C** of the machine shown in Fig. 5.

- A .....
- B .....
- C ..... [3]

10 Fig. 6 shows the end of a piece of wood. Two holes will be drilled at the centres shown. Add to Fig. 6 to show a drilling jig that could be used to make sure that the holes are drilled accurately.

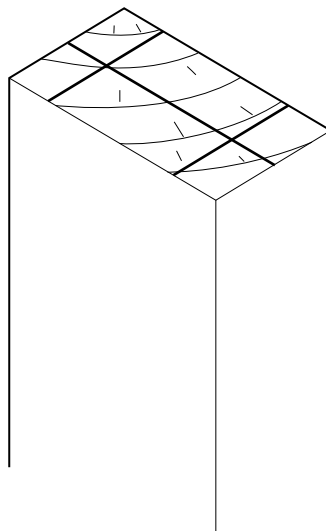


Fig. 6

[3]

## Section B

Answer **one** question in this section.

- 11 Fig. 7 shows a tray made from 6 mm thick acrylic sheet.

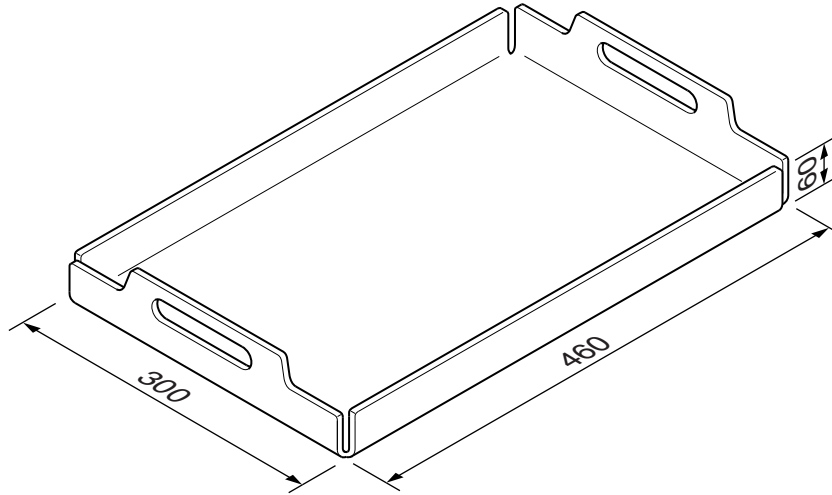


Fig. 7

- (a) (i) Fig. 8 shows the acrylic sheet from which the tray will be cut.

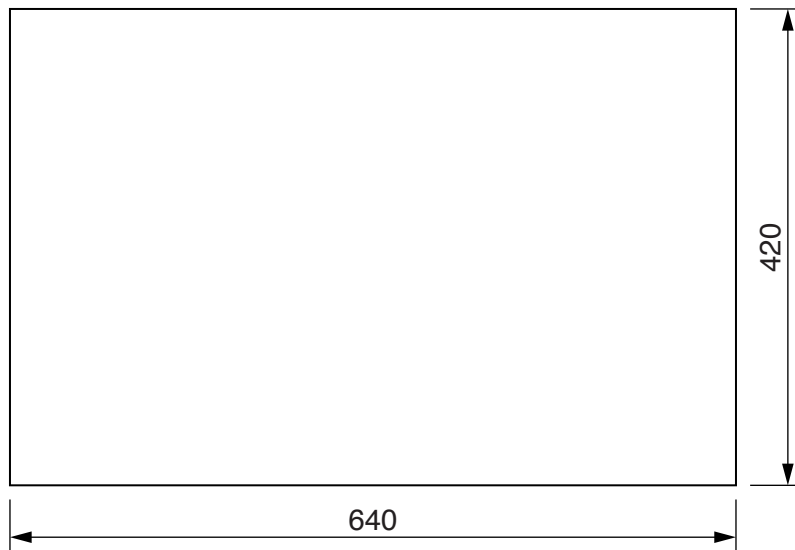


Fig. 8

Draw on Fig. 8 the development (net) of the tray.  
 Indicate those lines that will be bent and those that will be cut.  
**Do not** include the cut out handholds but **do** include the shaped ends.

[5]

- (ii) Give **one** advantage of using a marker pen rather than a scribe when marking lines on acrylic.

..... [1]

- (iii) Give **two** reasons why there is a gap at each corner of the tray.

1 .....

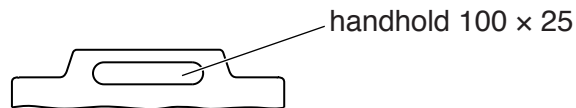
2 ..... [2]

- (b) Complete the table below by describing **three** stages in finishing the cut edges of the acrylic to a high quality.

Stage	Process
1	
2	
3	

[3]

- (c) (i) Details of one of the handholds are shown below.  
Use sketches and notes to show how the handhold could be cut out and the edges made smooth. Name all the tools used.



[4]

(ii) Give **one** reason why a designer would need to consider ergonomics when designing the handholds.

.....

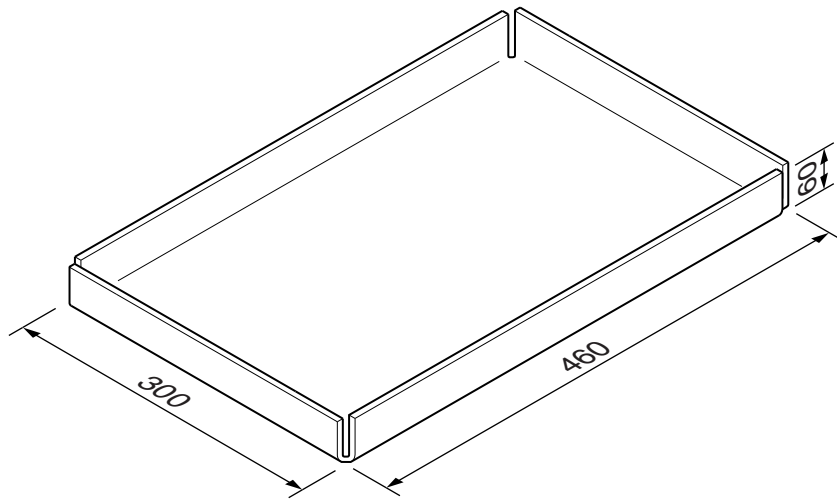
..... [1]

(d) Use sketches and notes to show how the development (net) of the tray would be heated and bent to shape.

[3]



(e) Fig. 9 shows a different design for a tray made from 6 mm thick acrylic sheet.



**Fig. 9**

Use sketches and notes to show a design for a separate handle that would be attached to each end of the tray.

Your design must show the following:

- details of the material from which the handle is made and sizes;
- how the handle would be made in a school workshop;
- the method of attaching the handle securely to the tray.

[6]

- 12 Fig. 10 shows a bedside table. The height of the bedside table can be adjusted. The table top is made from veneered manufactured board. The legs and upright are made from square metal tube.

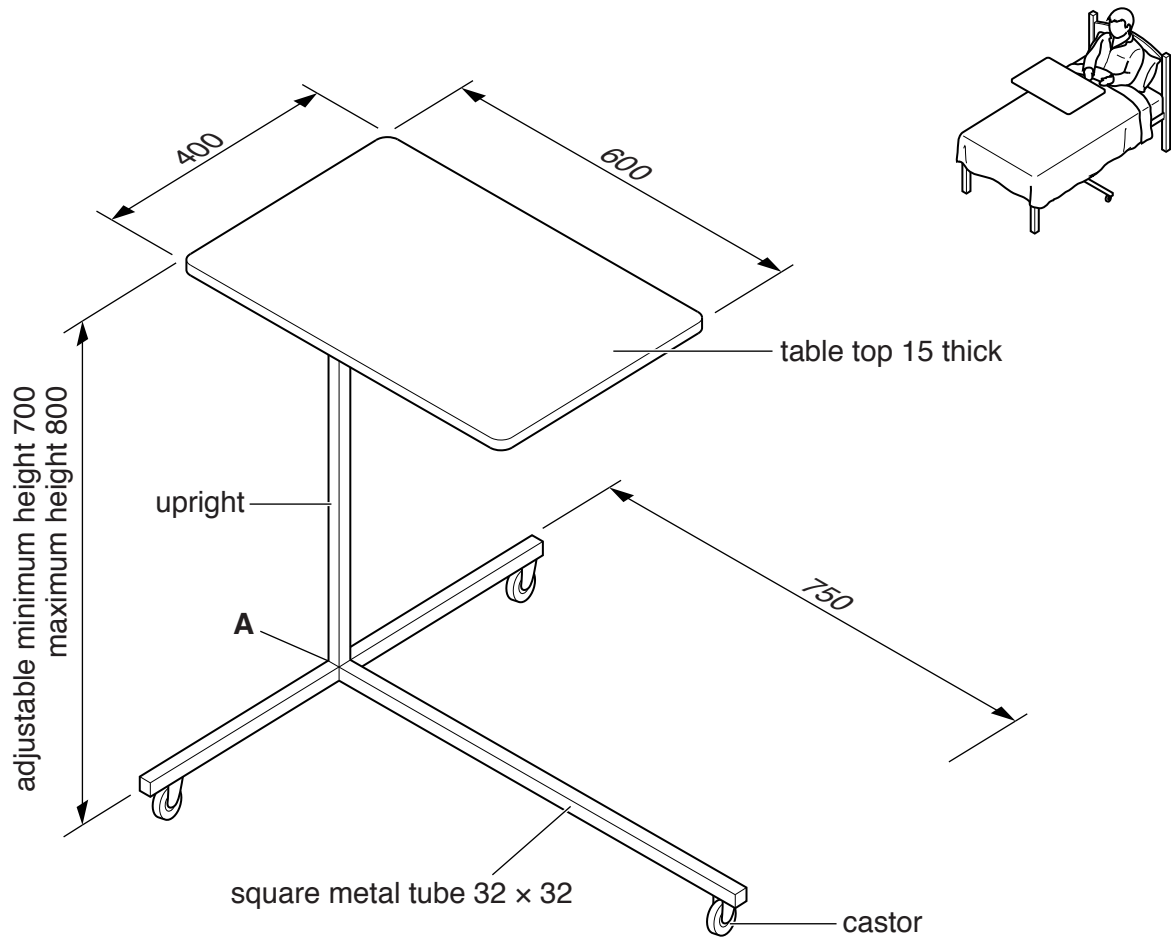


Fig. 10

- (a) Name a suitable manufactured board for the table top.

..... [1]

- (b) Give **one** disadvantage of using veneer on a manufactured board rather than solid wood for the table top.

..... [1]

(c) Use sketches and notes to show a modification to the table top that would prevent items from slipping off.

Include:

- names of materials used;
- methods of construction;
- **three** important sizes.

[5]

(d) Use detailed sketches and notes to show how the upright could be fixed securely to the underside of the table top. Additional materials may be used.

[5]

- (e) Use sketches and notes to show how the joint at **A** could be strengthened. Include details of materials, sizes and constructions used.

[4]

- (f) Use sketches and notes to show how the table top could be adjusted and locked at different heights between 700 mm–800 mm. Include details of materials, sizes and constructions used.

[6]

(g) Explain how a designer would use anthropometric data when designing the bedside table.

.....

.....

.....

..... [3]

13 Fig. 11 shows details of a coffee table made from two separate parts. Each part is made from laminated wood.

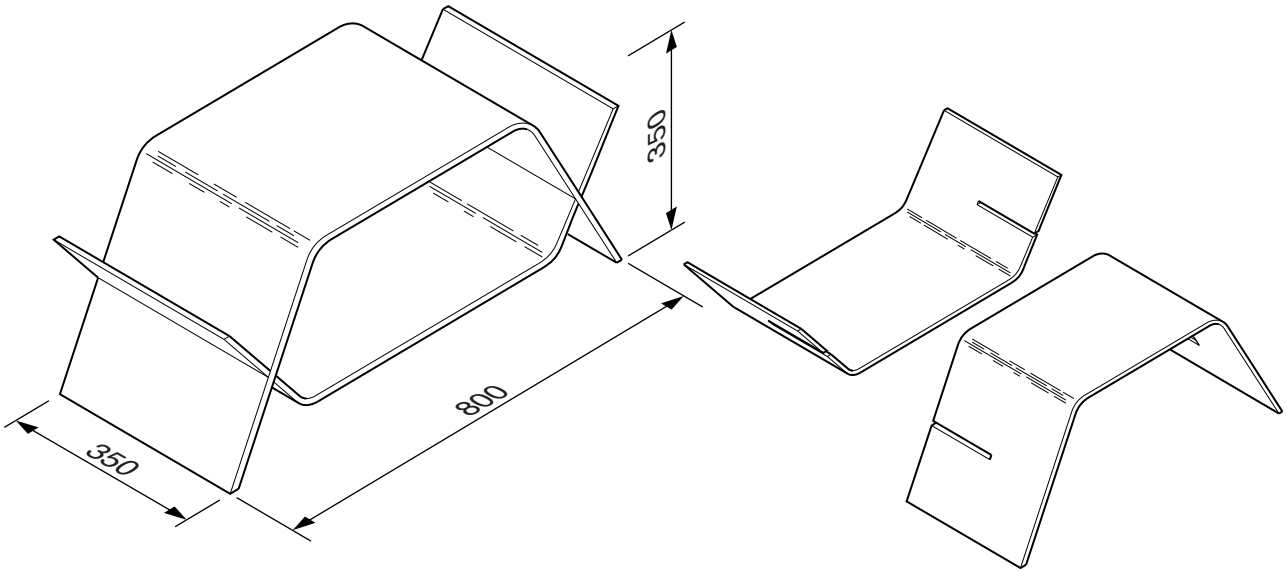


Fig. 11

(a) When designing the coffee table a designer would need to meet a list of specification points. Give **three** specification points for the coffee table.

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

(b) Use detailed notes and sketches to show how **one** part of the coffee table would be laminated to a thickness of 15 mm.

[5]

(c) Fig. 12 shows part of the coffee table with details of a slot marked out ready to be cut out.

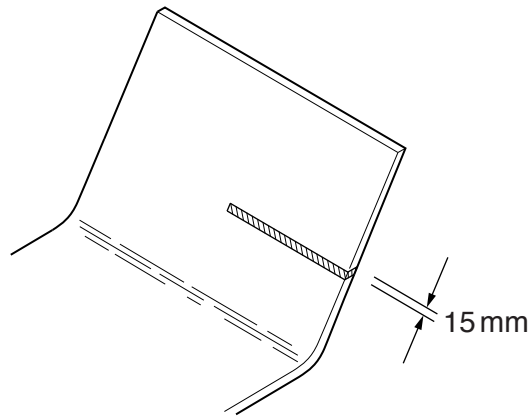


Fig. 12

(i) Name **two** marking out tools, other than a pencil and steel rule, used to mark out the slot.

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

(ii) Name **two** tools that could be used to cut out the slot.

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

(d) Describe the purpose of the following items used to prepare the surfaces of the laminated parts to take a finish:

- (i) a cork block;  
.....
- (ii) a damp cloth;  
.....
- (iii) glasspaper.  
..... [3]

(e) The coffee table will have a finish applied with a brush.

- (i) Give **two** reasons why the coffee table requires an applied finish.
  - 1 .....
  - 2 ..... [2]

**TURN OVER FOR THE REST OF THIS QUESTION**

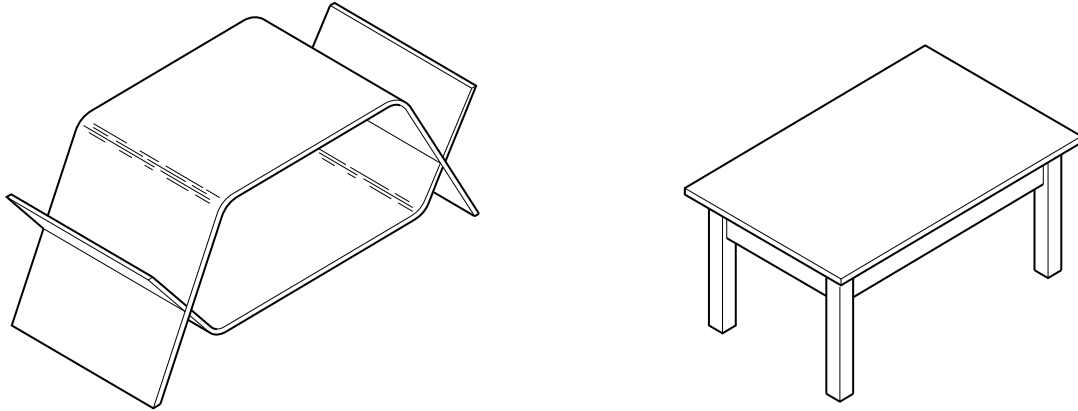
(ii) Name **one** suitable finish for the coffee table.

..... [1]

(iii) Give **one** precaution you would take to ensure a high quality finish when using a brush.

..... [1]

(f) Fig. 13 shows a laminated wood coffee table and a traditional coffee table with legs and rails.



**Fig. 13**

Give **two** advantages of using a laminated wood construction rather than a traditional legs and rails construction for a coffee table.

1 .....

2 ..... [2]

(g) Explain how the use of a computer could help a designer when:

(i) carrying out research;

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

(ii) designing the coffee table.

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

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