



STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1995

INDUSTRIAL TECHNOLOGY

2 UNIT

PART B—WOOD

*Time allowed for Part A and Part B—Two hours and a half
(Plus 5 minutes' reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Where appropriate, show working for solutions neatly and clearly.
- You may use approved drawing instruments and calculators.

Part B—Wood

- Question 5 is COMPULSORY (5 marks).
- Attempt THREE questions from Questions 6, 7, 8, and 9 (5 marks each).

EXAMINER'S USE ONLY

Question			
5			
6			
7			
8			
9			

PART B—WOOD

QUESTION 5. This question is COMPULSORY. (5 marks)

A pictorial sketch of a side gate is shown in Figure 1. The gate will be stained a natural colour to show the grain of the timber, and be finished in a water-repellent preservative.

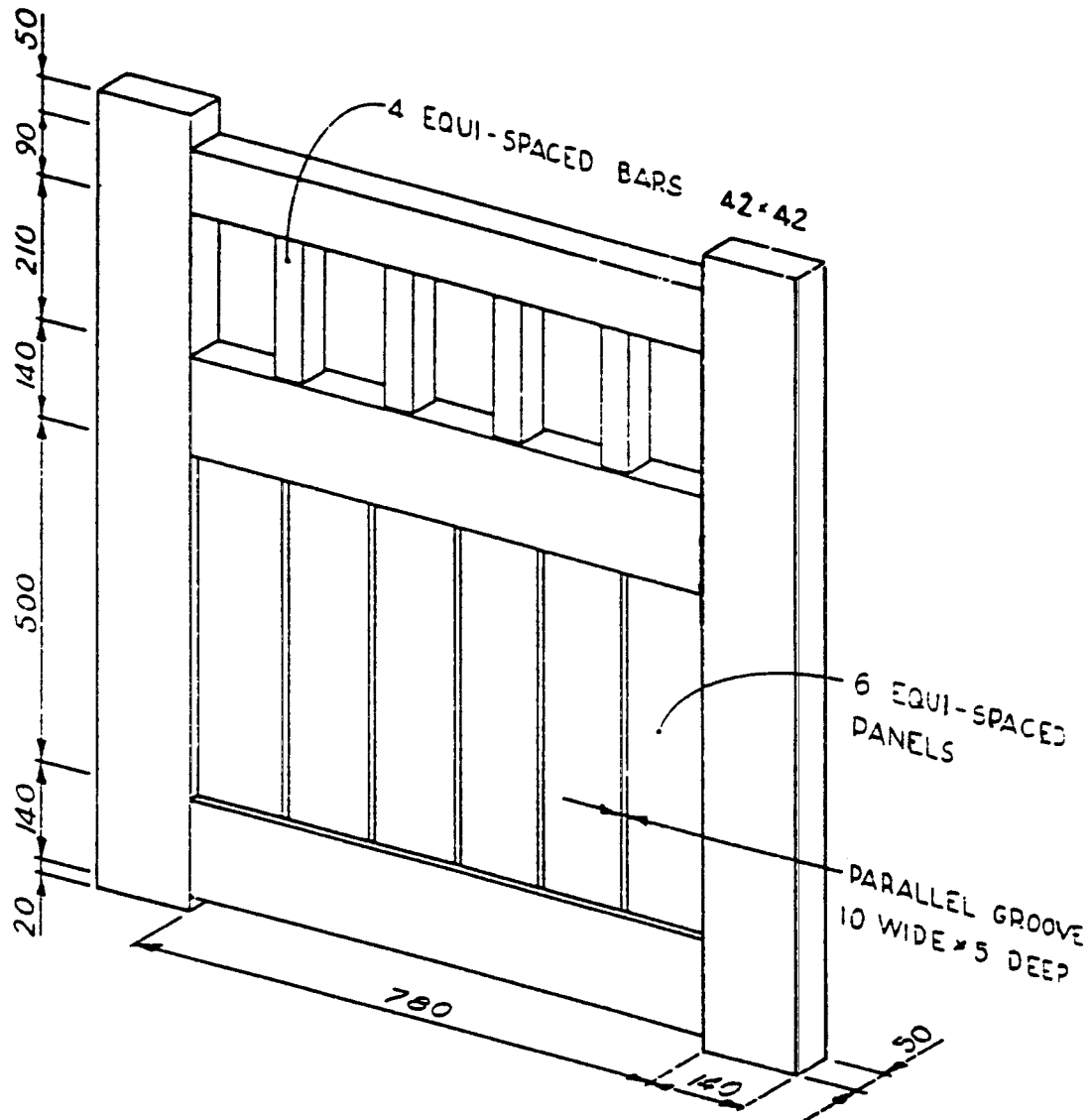
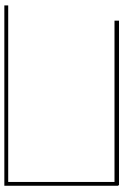


FIG. 1

QUESTION 5. (Continued)

- (a) Figure 2 shows the partly completed front view of the gate.
Complete this view. Do not show hidden detail.



Scale 1 : 10

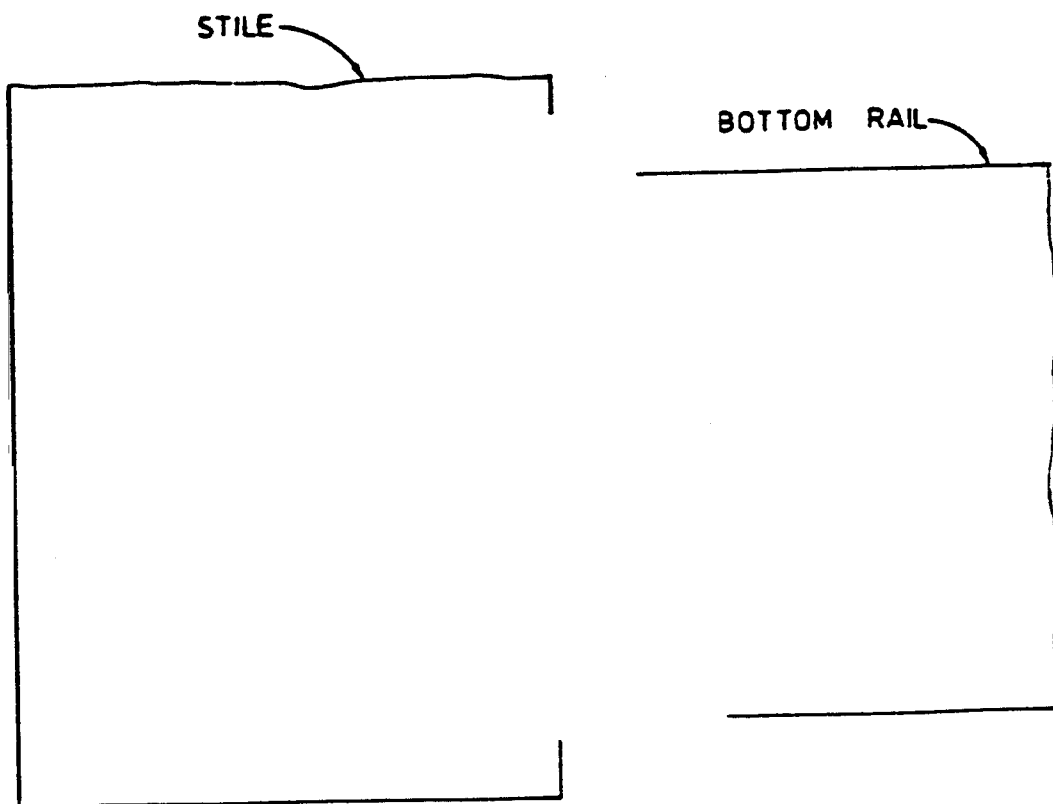
FIG. 2

QUESTION 5. (Continued)

- (b) The joint between the rails and the stiles is a through mortise and tenon. The panels are housed into the stiles, bottom rail and mid-rail.

Complete the partially completed sectional view through the joint, shown in Figure 3, showing all parts assembled.

Show on your drawing ONE method of strengthening the joint.



SECTIONAL FRONT VIEW

Scale 1 : 2

FIG. 3

QUESTION 5. (Continued)

- (c) Complete the cutting list of the material required to make one gate. The bars are tenoned into the top rail and mid-rail.

<i>Item</i>	<i>No. required</i>	<i>Length</i>	<i>Width</i>	<i>Thickness</i>
Stiles			140	
Top rail	1			50
Mid-rail	1			50
Bottom rail	1			50
Bars	4	42	42	
Panels				

- (d) The following timber costs were obtained from a supplier:

- 90 mm × 50 mm @ \$7.75 per metre
- 140 mm × 50 mm @ \$12.90 per metre
- 42 mm × 42 @ \$3.50 per metre
- 142 mm × 19 mm panelling @ \$6.80 per metre

Using the above prices, calculate the cost of the material used in one gate.

- (e) The gates can be made out of either a hardwood or a softwood.

Suggest a suitable hardwood and softwood and give reasons for your selections.

Hardwood

Reason

.....

Softwood

Reason

.....

QUESTION 5. (Continued)

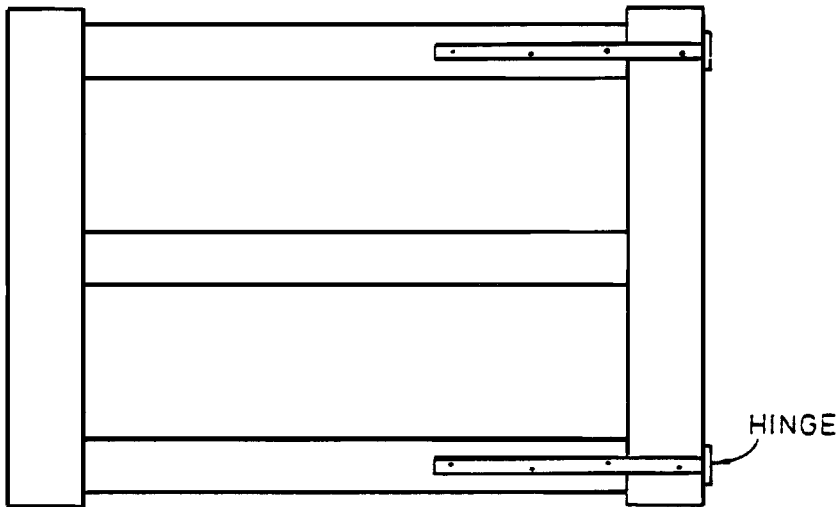
(f) The gates will be 'braced' behind the panelling.

(i) State TWO advantages of bracing.

1.

2.

(ii) Indicate on Figure 4 how a brace would be positioned if the gate was hinged as shown.



Not to scale

FIG. 4

(g) Gates, like any outdoor furniture, are exposed to rain and sunshine.

List FOUR effects that this may have on the timber.

(i)

(ii)

(iii)

(iv)



Attempt THREE questions only from Questions 6, 7, 8, and 9.

QUESTION 6. (5 marks)

Radiata Pine is a species that was introduced into Australia for our timber-development program.

(a) (i) From which continent was it introduced?

.....

(ii) List THREE reasons why Radiata Pine was chosen by the Developing Authority as its main species to develop.

1.

2.

3.

(b) Figure 5 shows the cell structure of Radiata Pine. Name the parts indicated.

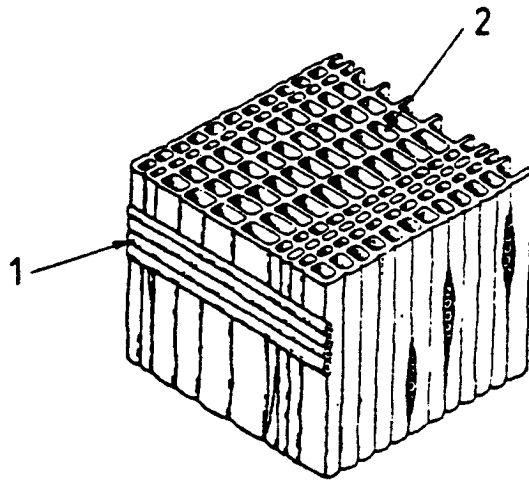


FIG. 5

1.

2.

(c) (i) In forest management, the tree breeder's aim is to improve the quality of timber.

Name TWO growing defects that can be eliminated by good tree breeding.

1.

2.

QUESTION 6. (Continued)

- (ii) In order to generate profitable Radiata Pine forests, seeds and cuttings must be taken from trees that produce high-quality timber.

With regard to the trees in the forest, list the features of THREE trees that will produce *good*-quality timber and the features of THREE trees that will produce *poor*-quality timber.

<i>Good-quality timber</i>	<i>Poor-quality timber</i>

- (d) (i) Backsawing is one method that is used to convert logs into plank form. On Figure 6, indicate how the log would be sawn using the backsawing method.

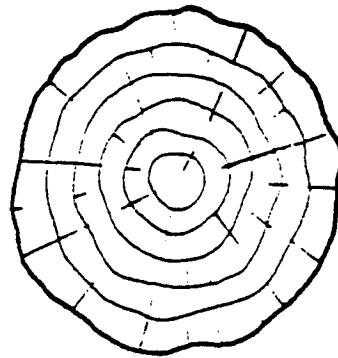


FIG. 6

- (ii) What advantage does backsawing have over the live-sawing method?

.....

.....

.....

QUESTION 6. (Continued)

- (e) Figure 7 shows the end-grain of three sawn planks before seasoning. On Figure 7, draw the new shape of each plank following poor seasoning.

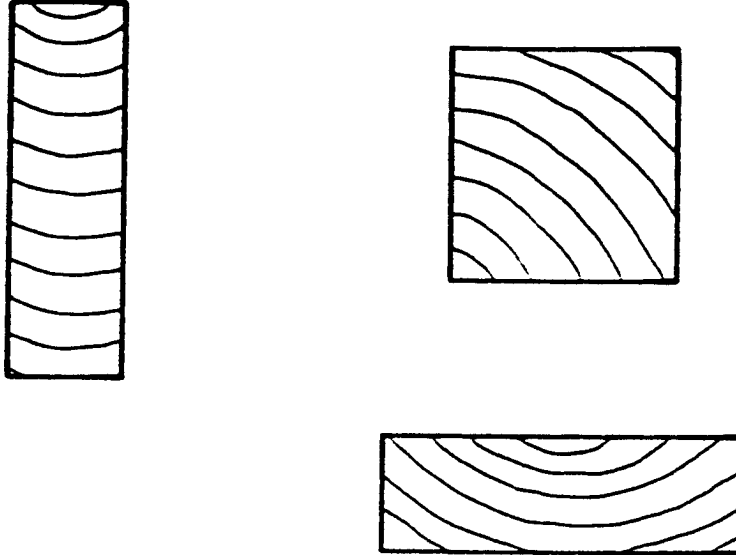


FIG. 7

- (f) Radiata Pine is used in the manufacture of plywood.
 - (i) Why does plywood always have an odd number of layers?

.....

- (ii) Why are the layers always arranged at 90° to each other?

.....

- (g) Plywood has many different uses in industry.

Name TWO different types of plywood used in industry. Explain how the individual characteristics of each type are achieved.

- (i) Type

Explanation

.....

- (ii) Type

Explanation

.....

Attempt THREE questions only from Questions 6, 7, 8, and 9.

QUESTION 7. (5 marks)

Figure 8 shows the front and side views of a bedside cabinet manufactured from veneered particle board with a timber-framed door fitted with a 6 mm plywood panel. The cabinet is manufactured using knock-down fittings.

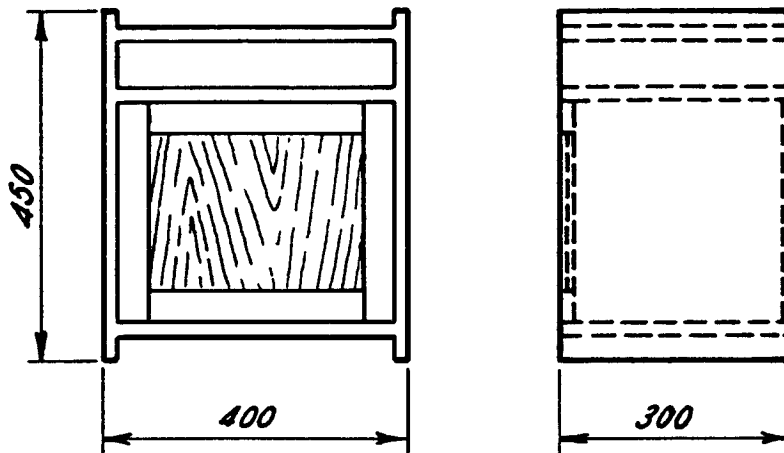


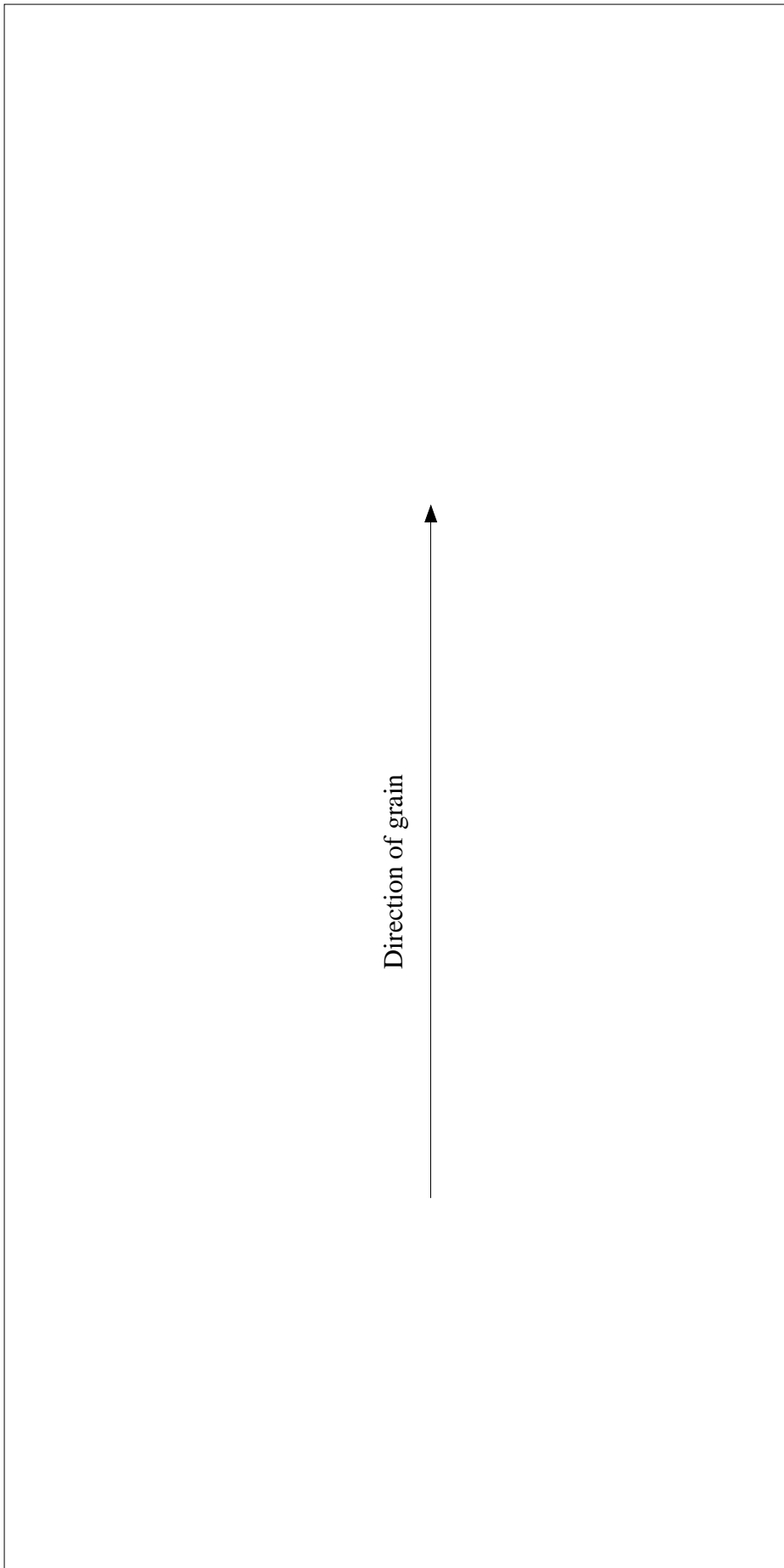
FIG. 8

- (a) Figure 9 shows a sheet of particle board $2440 \times 1220 \times 18$ mm drawn to scale.
- (i) Lay out on Figure 9 the parts of the cabinet, so as to make efficient use of the sheet.

Allow 5 mm for saw cuts.

Dimension the figure.

QUESTION 7. (Continued)



Scale 1 : 10

FIG. 9

Question 7 continues on page 12

QUESTION 7. (Continued)

- (ii) What is the maximum number of completed units that can be cut from one sheet?

.....

- (b) (i) What do you understand by the term 'slicing' when referring to veneers?

.....

.....

- (ii) Use a flow diagram to explain how sliced veneers are manufactured.

- (iii) After manufacture, why are sliced veneers always kept in the same order as they come off the log?

.....

.....

.....

- (c) Particle board is being increasingly used in the furniture industry instead of solid timber.

List FIVE advantages that particle board has over solid timber.

1.

2.

3.

4.

5.

QUESTION 7. (Continued)

(d) The cabinet carcass is manufactured using knock-down fittings.

Name and sketch ONE type of fitting that could be used to assemble the carcass.

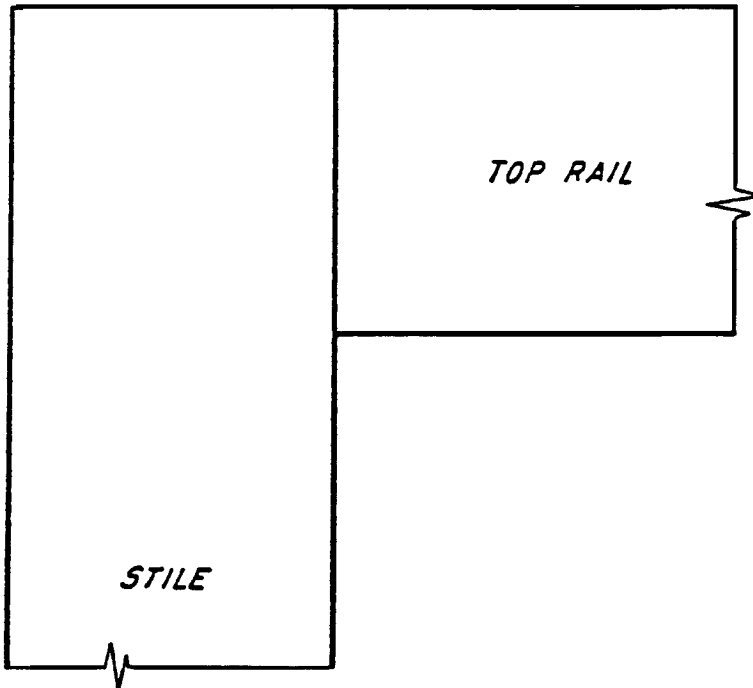
Name

Sketch

(e) Figure 10 shows the front view of the stile and top rail of the door.

(i) Complete the figure, showing a joint that could be used to join the two pieces together and also allow the fitting of a 6 mm plywood panel.

Show all hidden detail.



Scale 1 : 1

FIG. 10

QUESTION 7. (Continued)

- (ii) Name the corner joint you have used in Figure 10.

.....

- (iii) Complete the section through the stile and the panel shown in Figure 11. Show how the panel is fitted in position.



Scale 1 : 1

FIG. 11

- (f) In industry, the cabinet is to be furnished with nitro-cellulose lacquer.

- (i) Name a finishing process that could be used if the cabinets are to be mass-produced.

.....

- (ii) Name the solvent that would be used to clean the equipment after use.

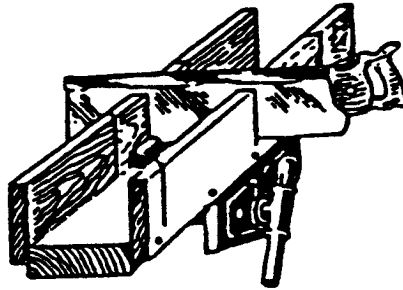
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Attempt THREE questions only from Questions 6, 7, 8, and 9.

QUESTION 8. (5 marks)

(a) (i) Figure 12 is a mitre box used to produce mitre joints. Give ONE application for the use of mitre joints other than picture frames.



.....
.....

FIG. 12. MITRE BOX

(ii) In school workshops, adjustable mitre boxes are used, while industry uses power mitre saws and power radial-arm saws.

What TWO advantages do power mitre saws have over the adjustable mitre-box saw?

1.
.....
2.
.....

(iii) Complete the list of safety precautions to be taken before using the power mitre saw. Safety precaution No. 1 has been given.

1. Wearing safety glasses and protective clothing.
2.
3.

QUESTION 8. (Continued)

(b) For occupational health reasons, it is necessary to collect the dust created by the mitre saw shown in Figure 13.

(i) List TWO methods commonly used.

1.

2.

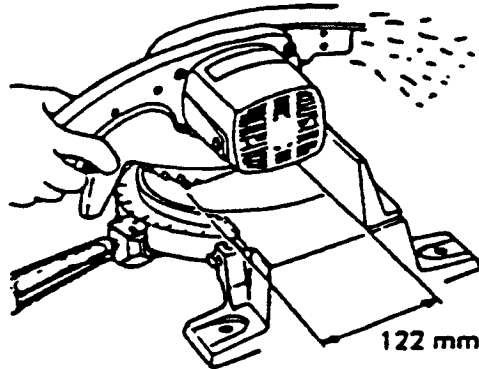


FIG. 13

(ii) Identify TWO health reasons for using either method stated in part (b) (i).

1.

2.

QUESTION 8. (Continued)

- (c) For the following three operations, a manufacturer is recommending specific blades for use with its mitre saws.

With reference to Figure 14, match each operation with its blade by writing the blade number in the boxes provided below.

<i>Operation</i>	<i>Blade number</i>
For smoother cross-grain cuts	
For faster, smoother, longer sawing without blade sharpening	
For rip and cross-cut work	

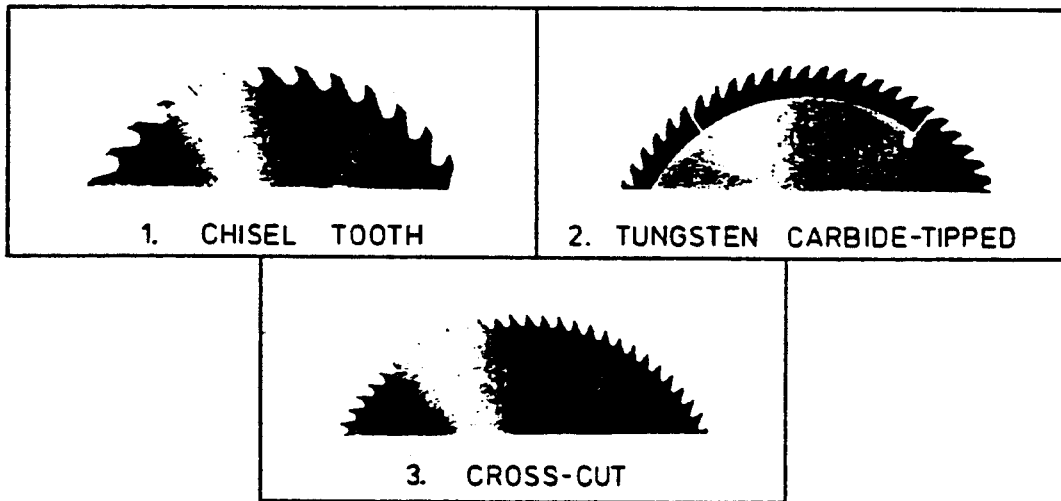


FIG. 14

- (d) Identify which chisel in Figure 15 is correctly sharpened, and state ONE reason for your answer.

- (i) Selection A or B
- (ii) Reason
-
-

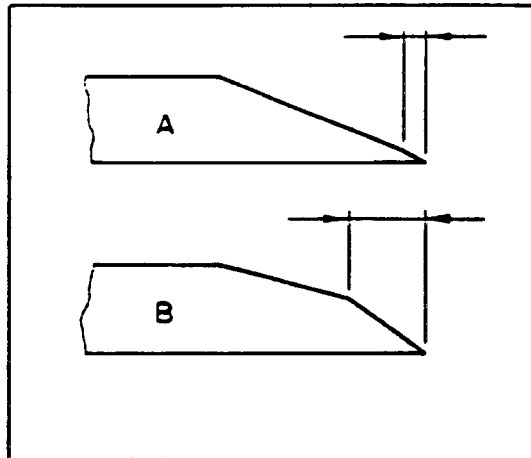


FIG. 15

QUESTION 8. (Continued)

- (iii) Given the two chisel profiles (Figure 16), which chisel is the most appropriate for use in a hard timber, e.g. tallowwood?

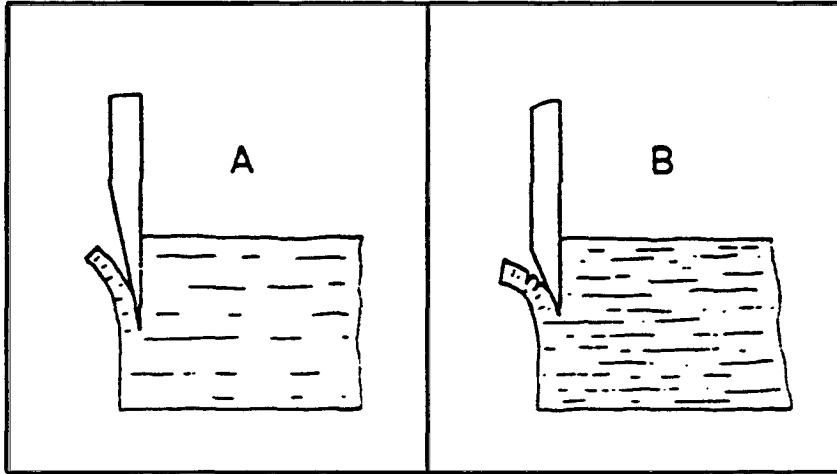


FIG. 16

Answer (A or B)

- (e) The dovetail joint is a strong carcass joint. It has been a very effective method of joining drawers and boxes.

- (i) State TWO factors contributing to its strength.

1.

2.

- (ii) Name TWO dovetail joints used in carcass construction.

1.

2.

- (iii) Name a machine that industry would use to cut the dovetail.

.....

- (f) In all forms of router work, deep cutting in one pass should be avoided where possible.

Why?

.....

.....

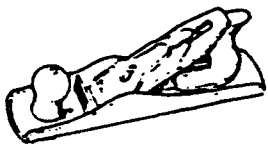
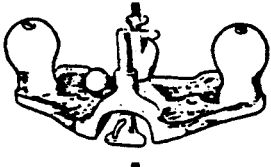

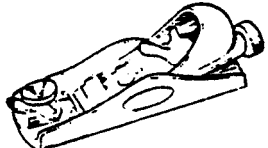


Attempt THREE questions only from Questions 6, 7, 8, and 9.

QUESTION 9. (5 marks)

- (a) Planes are one of the most common tools in the school workshop, but are rarely found in industry.

Complete the table below, showing that the operation carried out in the school workshop by a plane is performed in industry by a machine.

	<i>Name of plane</i>	<i>Operation</i>	<i>Machine used in industry</i>
			
			
			
			

- (b) (i) What is the purpose of a cap iron on a jack plane?

1.
-
2.
-

QUESTION 9. (Continued)

(ii) What is the result of a poorly fitted cap iron?

.....
.....

(iii) Why should the cap iron be set different distances from the cutting edge for Pacific Maple and Knotty Pine?

.....
.....
.....

(c) List, in order, the sequence of operations that would have to be carried out on a badly chipped plane blade to make it serviceable.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

QUESTION 9. (Continued)

Timber buildings are subject to decay. Two notable types of decay are dry rot and wet rot. How would a building inspector identify that:

(d) (i) dry rot was present in the building?

.....
.....

(ii) wet rot was present in the building?

.....
.....

(iii) What could be done to treat the areas infected with:

1. dry rot?

.....
.....

2. wet rot?

.....
.....

(e) In recent years, the furniture industry has developed a number of methods of joining boards together.

One way is the use of a biscuit jointer and biscuits.

(i) What is a 'biscuit'?

.....
.....
.....

QUESTION 9. (Continued)

(ii) Briefly describe the operation of a biscuit jointer.

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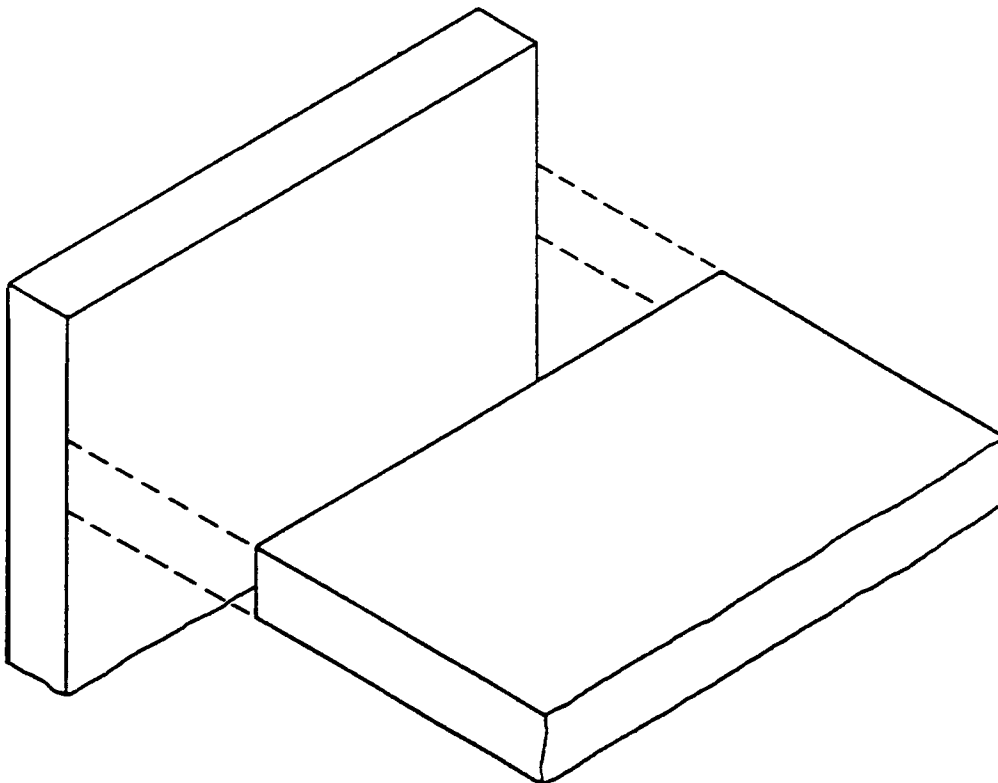
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(iii) Figure 17 shows the side and top of a cabinet. Draw a sketch to show how these components are joined using biscuits.



Not to scale

FIG. 17

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