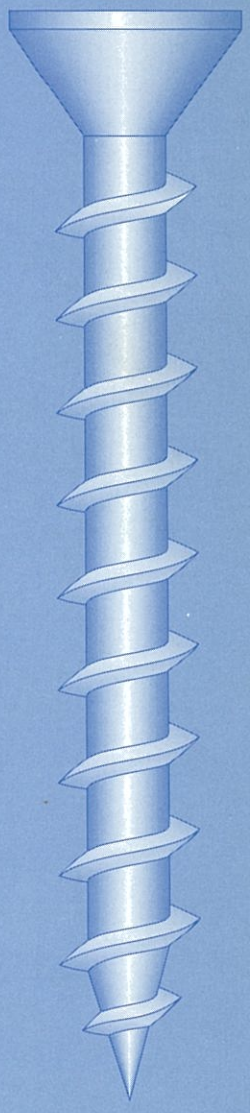
JUNIOR WORKSHOP A

ANSWER GUIDE 1



D.Schlyder

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Contents

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HEALTH AND SAFETY

1. Regulations, procedures, signs and other safety measures cannot protect students in the workshop unless they are *observed by the students themselves.*

2. List three examples of good 'housekeeping' in the wood shop.

a. *For example: Benches should be kept clean and tidy.*

b. *Machines should be kept clean and free of waste materials.*

c. *Tools and equipment should be stored correctly when not in use.*

3. Give an example of an injury that could be caused in the wood shop by using a defective hand tool. *For example: A loose hammer head could fly off and hit someone.*

4. What action should a student take if a defect is observed in any item of electrical equipment? *Defects in electrical equipment must be reported immediately.*

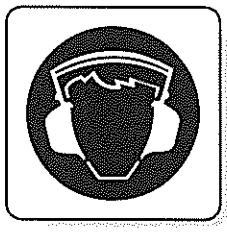
5. List three personal protective devices that could be worn to protect eyesight.

a. *Safety spectacles.*

b. *Safety goggles.*

c. *Face shield.*

6. What is the meaning of the safety sign shown on the right?



Hearing protection must be worn.

7. Briefly describe safety precautions that should be observed when using volatile liquids such as solvents and paints.

Volatile liquids should only be used where there is adequate ventilation and well clear of heat sources.

FORESTS AND THEIR PRODUCTS

1. Name three aspects of Forest Management.

a. *Thinning* b. *Pruning* c. *Fire protection*

2. Write a brief sentence describing each of the aspects of Forest Management in your answer to question 1.

a. *Thinning is the process of removing some smaller and weaker trees to help the best ones grow to maturity.*

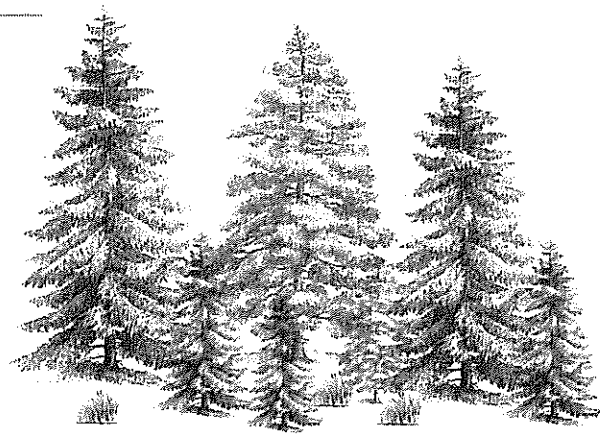
b. *Pruning lower branches prevents loose knots in timber and helps in fire control. Subsequent growth of the pruned part will be knot free.*

c. *Clearing underbrush and lower branches and provision of fire breaks help to prevent a fire from spreading.*

3. The sketch on the right shows a typical scene in a pine forest.

In the space provided below neatly sketch a similar scene after forest management techniques have been applied.

Try to illustrate your answers to question 2 in this sketch.



The student's sketch should show lower branches pruned to approximately one third of the height of the tree, small trees and underbrush removed and perhaps some indication of a fire break.

4. Australia's natural forests are mainly:

a. Softwoods. b. Exotic Timbers. (c.) Hardwoods. d. Pine.

5. Name two common softwoods grown specially for the wood-chip industry.

a. *Radiata pine* b. *Slash pine*

6. List three commercial uses for thinnings from pine plantations.

a. *Pulp* b. *Particleboard* c. *Case timber*

7. What is the Forester's term for felling the whole of a usable crop of plantation trees?

a. Selection (b.) Clear Felling c. Silviculture d. Selection Clearing

8. Name three Australian timbers which are suitable for furniture and cabinet construction.
For example:
a. *Hoop pine* b. *Qld maple* c. *Red cedar*

9. Name two Australian timbers suitable for heavy building construction.

a. *Spotted gum* b. *Iron bark*

10. Name the Australian softwood described by the following characteristics:

It often contains numerous knots and has a distinctive smell. It is pale yellow to light brown in colour with a close texture and is naturally termite resistent.

Cypress pine

11. Which of the following timbers is now being used for house framing?

a. Black Bean b. Hoop Pine (c.) Radiata Pine d. Queensland Maple

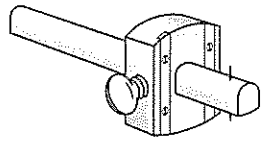
12. Name the imported timber that is described by the following characteristics:

It is a pale brownish colour with a darker face pattern; darker areas are harder than lighter areas; difficult to dress smoothly; has excellent load bearing capacity due to unusually long fibres.

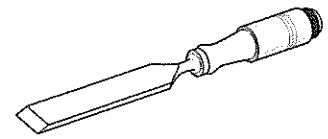
Oregon

WOODWORK TOOLS

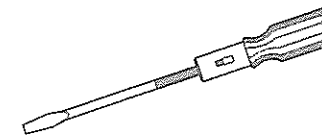
1. Name the woodwork tools shown below.



a. *Marking gauge*



b. *Firmer chisel*

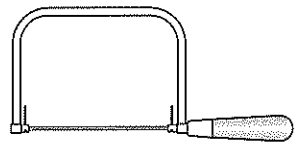


c. *Ratchet screwdriver*

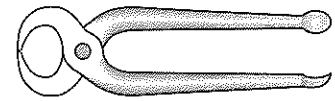
2. Which tool should be used to strike a chisel when cutting woodwork joints?

Mallet

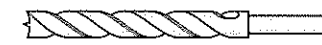
3. Name the woodwork tools shown below.



a. *Coping saw*



b. *Pincers*



c. *Dowel bit*

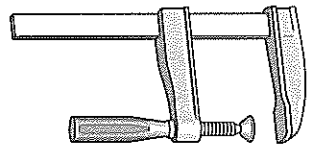
4. Name the part of the Jack Plane which holds the iron firmly in place.

Lever cap

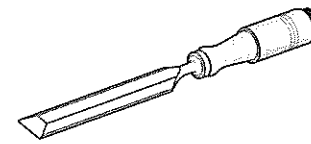
5. Plane irons and chisels are ground to an angle of *25°* and honed or sharpened to an angle of *30°* .

6. A *smoothing* plane is used for fine finishing work.

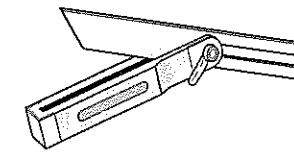
7. Name the woodwork tools shown below.



a. *Quick action clamp*



b. *Bevel edge chisel*



c. *Sliding bevel*

8. Describe the main differences between a file and a rasp.

The teeth of a rasp are coarse and are punched into the surface.

The teeth of a file are finer and are cut into the surface.

9. Name the plane used mainly for straightening long edges.

Try plane

10. A *spokeshave* is used to smooth rounded corners. This tool works on the same principle as the plane.

11. Name the woodwork tools shown below.

a. *Claw hammer* b. *Nail punch* c. *Spade bit*

12. The Tenon Saw has a special feature in its design. Name this feature and explain its purpose.

The tenon saw has a rigid 'back' which stiffens the blade and helps to keep the cut straight.

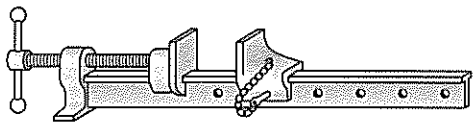
13. Name the tool used to scribe circles and arcs in marking out operations.

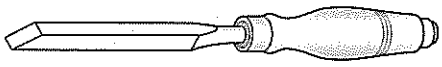
Wing dividers

14. Describe the main difference between softwood and hardwood auger bits.

Softwood auger bits have spurs on the tip to provide a clean cut.

15. Name the woodwork tools shown below.



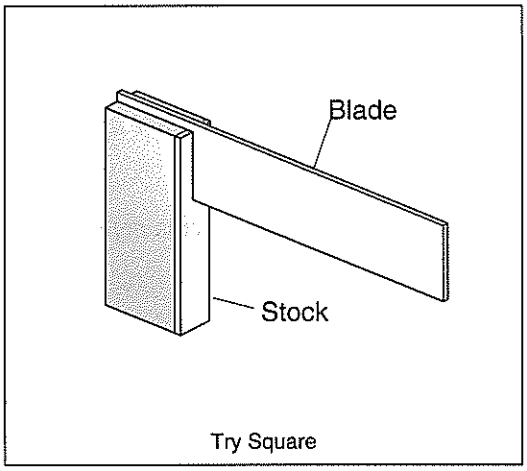


a. *Sash cramp* b. *Mortice chisel*

16. Draw a neat sketch of a Try Square in the space provided and name its parts.

Briefly describe how a Try Square is used in woodworking.

It is used to test timber for squareness and for drawing lines at right angles to the edges of timber while holding the stock against the face side or face edge.



Try Square

17. Figure 1 shows a piece of softwood which is to be shaped as shown in Figure 2.

List the measuring, marking and cutting tools you would need to do the job.

Rule, try square, marking gauge, wing dividers, tenon saw, chisel, coping saw, spokeshave or file.

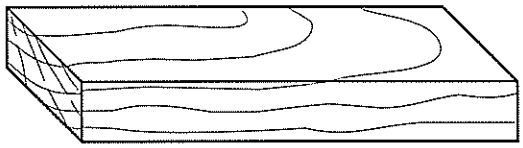


Figure 1

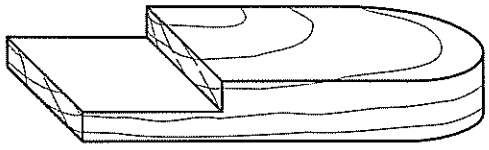


Figure 2

18. A *bevel edge* chisel would be used to remove the waste from the groove cut in the piece of timber shown in Figure 3.

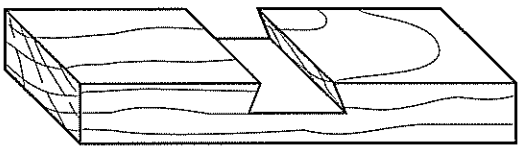


Figure 3

19. Briefly explain the reason for your answer to question 18 above.

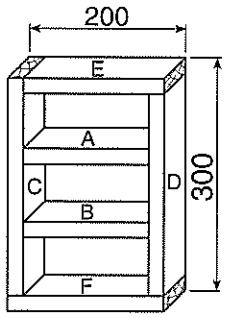
The bevelled edge of the chisel would fit the shape of the groove, allowing corners to be cleaned out neatly.

20. Briefly describe the 'set' of a Saw and state its purpose.

Alternate teeth are 'set' or bent in opposite directions to provide a saw cut wider than the thickness of the saw blade. This prevents jamming of the saw.

BUTT AND HOUSING JOINTS

The illustration on the right shows a frame made from 68 x 19 dressed softwood and assembled using Butt Joints which are glued and nailed. Parts A and B are equally spaced between parts F and E.



No.	Length
2	162 (A&B)
1	281 (C)
1	262 (D)
1	181 (E)
1	200 (F)

1. Complete the timber list showing number and finished length of all pieces of timber required to assemble the frame.

2. Name the glue generally used in the assembly of woodwork jobs such as the frame illustrated.

PVA (polyvinyl acetate)

3. Which of the following nails would be most suitable for assembling of the frame?

a. Hardboard b. Clout c. Brad (d.) Bullet Head

4. Which of the following would be the most suitable length for nails used in the assembly of the frame?

a. 20mm b. 30mm (c.) 50mm d. 70mm

5. Which of the following parts would be assembled last?

a. Part A (b.) Part F c. Part D d. Part B

6. Briefly explain the reasons for your answer to question 5.

A, B and D would be difficult to glue and assemble between other members. F's joints could be glued on the end grain of C and D allowing easy assembly and nailing.

7. Would Skew Nailing be the most suitable method of fixing part A and part B?

a. Yes (b.) No

8. Briefly explain the reasons for your answer to question 7.

The joint would be stronger if nailed through C and D. Skew nailing through the edges would spoil appearance. No room to skew nail through faces of A and B.

9. Should it be necessary to use clamps when assembling the frame?

a. Yes (b.) No

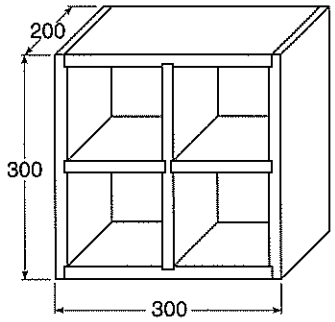
10. Briefly explain your answer to question 9.

Nails hold the joints together until the glue dries provided that joints fit well and are firmly nailed.

11. List the tools you would need to mark out and assemble the frame.

Rule, try square, hammer, punch, vice.

12. The drawing on the right shows a set of 'pigeon holes' which are to be made from plywood 20mm thick and assembled using housing joints. All housings are to be 5mm deep.

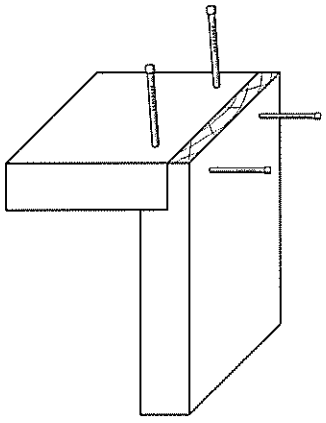


Complete the materials list showing number and finished size of all pieces of plywood required to construct the project.

No.	Size
2	*300* x 200
3	*270* x *200*
2	*130* x *200*
	x

13. A special nailing technique can be used to provide increased strength in a Rebate Housing joint.

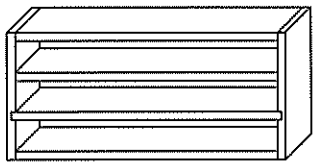
Using the adjacent drawing, neatly sketch the nails started in position ready to be driven in.



14. List all the measuring, marking and cutting tools you would need to prepare the joint and any other tools or equipment needed to assemble the joint.

Rule, try square, marking gauge, tenon saw, chisel, hammer, nail punch, vice.

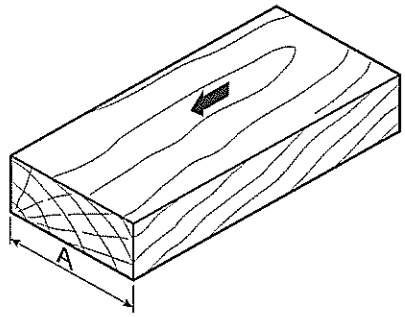
15. The drawing on the right shows a wall cupboard with two shelves. The top shelf is butted and nailed to the sides of the carcase and the lower shelf is housed in. Why would the lower shelf be capable of carrying more weight?



The housing shoulders would carry more weight than the butt joints in the top shelf.

WOODWORK TERMS

1. If you planed the face of the piece of timber shown on the right in the direction of the arrow, you would be planing:

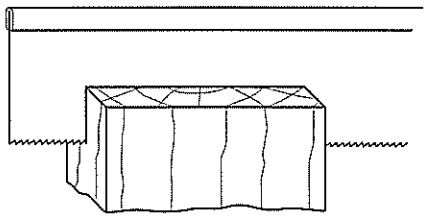


(a.) against the grain.
b. with the grain.
c. across the grain.
d. straight grain.

2. Which of the following dimensional terms is marked 'A' in the sketch of the piece of timber above?

a. Thickness b. Length c. Depth (d.) Width

3. The diagram on the right illustrates a cut being made with a tenon saw:

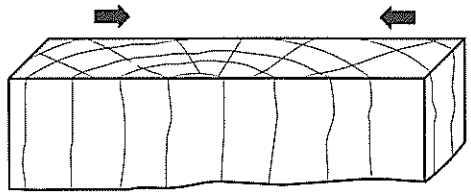


a. across the grain.
(b.) with the grain.

4. A saw cut with the grain is called a *rip* cut.

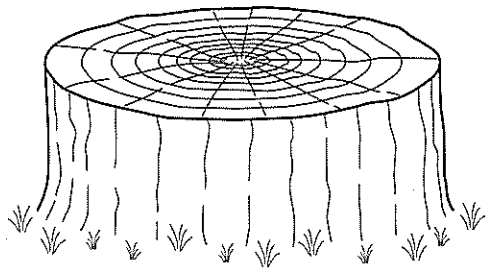
5. The *end grain* is the pattern formed on the cross section of a piece of timber by the growth rings and medullary rays.

6. Why would you plane from both ends toward the centre as indicated by the arrows in the adjacent diagram?



If the timber was planed across the full width, the back corner would probably chip (break away).

7. Sketch the 'growth rings' and 'medullary rays' in the drawing of the tree stump.

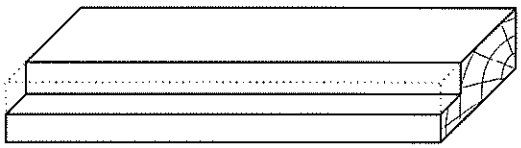


8. The *annual growth* of the tree is represented by the distance between the growth rings.

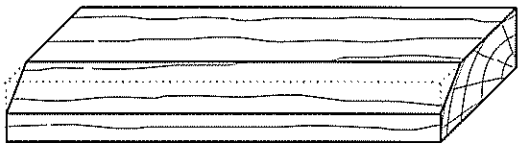
9. How could you determine the age of the tree?

Count the number of growth rings.

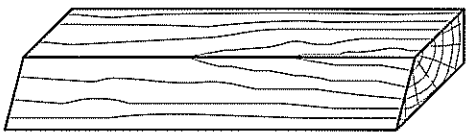
10. Complete the adjacent sketch of a piece of timber by showing a rebate on the front edge. Also show the end grain.

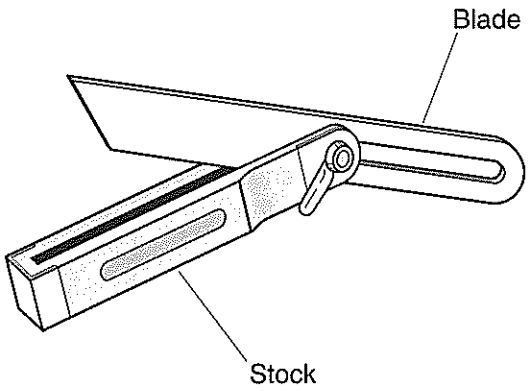


11. Complete the adjacent sketch of a piece of timber by showing a chamfer on the front edge. Also show the end grain and figure.



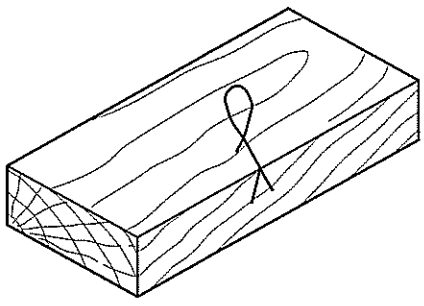
12. A 'Sliding Bevel' would be used to test the angle of the bevel on the edge of the piece of timber in the adjacent diagram. Draw a neat sketch of a Sliding Bevel in the space below and name its parts.



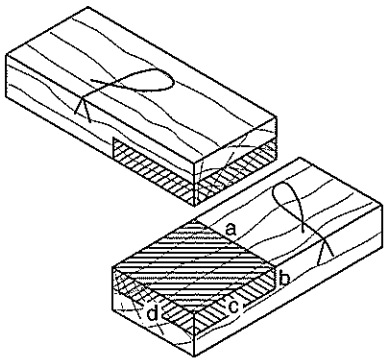


Sliding Bevel

13. Draw a 'Face Mark' and an 'Edge Mark' on the piece of timber shown in the illustration on the right.



HALVING JOINTS



1. The drawing on the right shows two pieces of timber marked out ready to cut a corner halving joint.

a. Clearly mark (by cross hatching) the parts to be removed (waste).

b. Draw a face mark and edge mark on each piece of timber.

2. Briefly state the purpose of face marks and edge marks in woodworking.

To identify the face side and face edge from which all marking tools are to be used.

3. Beside each letter below write the name of the tool which would be used to mark the corresponding line on the setting out of the corner halving joint above.

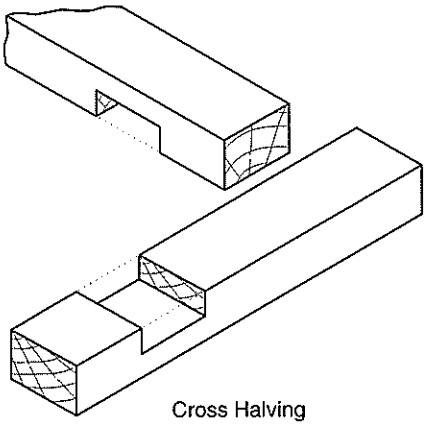
a. *Try square*

b. *Try square*

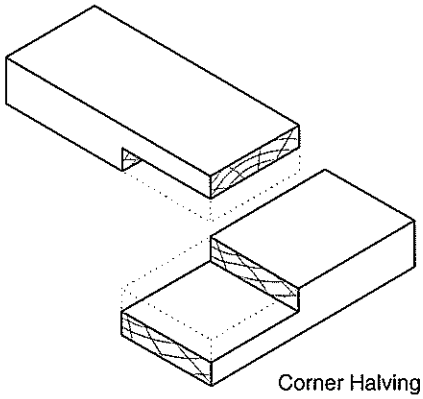
c. *Marking gauge*

d. *Marking gauge*

4. Complete the sketches below showing the waste material removed. Also show end grain.

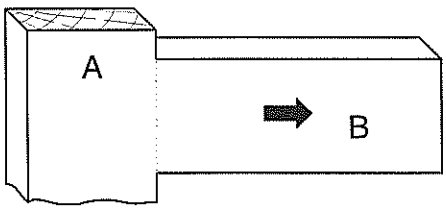


Cross Halving



Corner Halving

5. The diagram on the right shows part of a project you are designing. The two pieces of timber marked A and B are to be joined together. The arrow shows the direction in which stress would be placed on the joint when the finished product is being used.



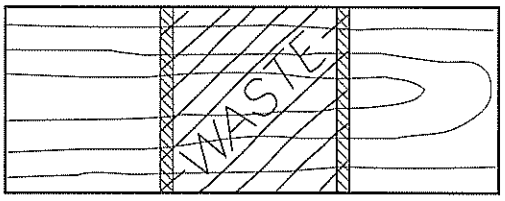
Which joint would you use in the design? *Dovetail halving*

6. Briefly explain how the joint you have selected would resist the strain applied in the direction of the arrow.

The wedge shape of the dovetail prevents the joint from being pulled apart in the direction of the arrow.

7. The adjacent diagram represents the face side of a piece of softwood with a halving marked out ready to be cut.

Draw the saw cuts that you would make in the first stage of waste removal. The saw cuts should be about 2mm wide.

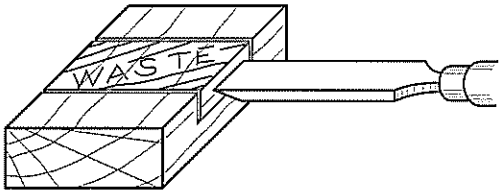


8. Briefly explain the reason why the saw cuts should be positioned as you have shown them in the sketch.

The saw cuts must be on the waste side of the line otherwise the halving will be wider than the part that fits into it and the joint will show a gap.

9. The diagram on the right shows a chisel about to be used to remove some of the waste from a halving. Is the chisel in the correct position to make the first cut?

a. Yes (b.) No



10. Briefly explain your answer to question 9.

The chisel handle should be raised so the bevel allows the cutting edge to make a parallel cut in the waste. In the position shown the bevel would push the cutting edge upward.

11. When marking out halving joints it is very important to use *face* and *edge* marks. A slight error in setting the *marking* gauge to the centre of the thickness of the material will still result in a flush joint if both pieces are gauged from the *face* side or face *edge*, as the case may be.

PLASTICS

1. The history of plastics began around the year:

a. 1800. (b.) 1870. c. 1930. d. 1950.

2. A vegetable product was first used to produce a plastic used as a substitute for ivory in the manufacture of billiard balls. This early plastic material was called:

a. Cellulite.
b. Cellulite Nitrate.
(c.) Cellulose Nitrate.
d. Cellulose Plastikos.

3. Animal protein, usually in the form of milk, was used to produce a range of plastic materials called:

(a.) Casein Plastics.
b. Dairy Plastics.
c. Protein Plastics.
d. Protein Cellulates.

4. Phenol Formaldehyde was originally produced from substances extracted from naturally occurring material. Which two of the following materials were used?

(a.) Wood Alcohol
b. Crude Oil
(c.) Coal Tar
d. Natural Gas

5. Rapid advancement in the plastics industry occurred during which 20 year period?

a. 1870 to 1890
b. 1910 to 1930
(c.) 1930 to 1950
d. 1960 to 1980

6. Which of the following was the most important source of raw material for the plastics industry during the 20 year period when most of the plastics used today were developed?

(a.) Coal
b. Crude Oil
c. Natural Gas
d. Other Natural Materials

7. Which of the following could not be made successfully from plastic materials?

a. Carpets
b. Clothing
c. Food Packaging
(d.) Electrical Conductors

8. Plastic materials all have the same chemical composition.

a. True (b.) False

9. Describe a health hazard that occurs when plastic is burnt.

Toxic (poisonous) fumes are released.

10. List the two general properties of plastics which you consider to be most important in the design of an electrically illuminated advertising sign intended for exterior installation and positioned within reach of passers by.

Plastics are good electrical insulators.

Plastics do not rot or corrode.

11. Briefly describe a 'Thermoplastic' material.

It will soften readily with the application of heat and will harden again when the temperature returns to normal.

12. What is the general term used to describe plastic materials which require a catalyst to effect the chemical change that causes them to set?

Thermosets or Thermosetting Plastics.

13. What is the full chemical name for acrylic?

Polymethyl-methacrylate

14. Cast acrylic sheet becomes pliable at about:

a. 85°C. b. 100°C. (c.) 120°C. d. 200°C.

15. The best moulding temperature for acrylic sheet is in the range:

a. 90°C to 100°C. b. 100°C to 110°C. c. 120°C to 130°C. (d.) 150°C to 160°C.

16. Briefly describe the effects of attempting to mould acrylic sheet at temperatures below those recommended.

Acrylic sheet may split, be highly stressed with lower demoulding temperature, have lower impact strength and less resistance to crazing.

17. If cast acrylic sheet is heated above 170°C it will begin to degrade. Briefly describe the changes which occur in acrylic when it shows the first signs of degrading.

Small bubbles or blisters begin to form in the acrylic sheet as it commences to degrade.

18. When cast acrylic sheet is heated to moulding temperature for the first time it:

a. shrinks in thickness but increases in length and width.
(b.) increases in thickness but shrinks in length and width.
c. shrinks in length but increases in width and thickness.
d. increases in length but shrinks in width and thickness.

19. Reheating acrylic will repeat the dimensional changes referred to in question 18.

a. True (b.) False

20. Acrylic sheet is a poor conductor of heat. How does this affect the cooling of a moulded article?

Acrylic sheet cools slowly, therefore moulded articles should be left in the jig or mould long enough to cool down so they will retain their shape.

21. Shaped acrylic articles should be held in the mould or jig until the material temperature has lowered to about:

a. 30°C. b. 40°C. c. 50°C. (d.) 60°C.

22. Briefly describe the effect of forced cooling on moulded acrylic articles.

Forced cooling causes uneven stresses and different cooling rates of the surface can result in distortion.

23. Briefly describe the 'plastic memory' that characterises acrylic sheet.

A moulded shape, when reheated, will demould and revert back to its original flat state.

24. Briefly describe the differences between 'adhesive' bonding and 'cohesive' bonding.

Adhesive Bonding: Faces are not fixed to each other but fixed to a film of glue between the surfaces.

Cohesive Bonding: A solvent actually dissolves the surfaces (freeing the molecules) which adhere when lightly pressed together.

25. Which of the following is not a solvent that is suitable for bonding acrylic sheet?

(a.) Mineral Turpentine

b. Chloroform

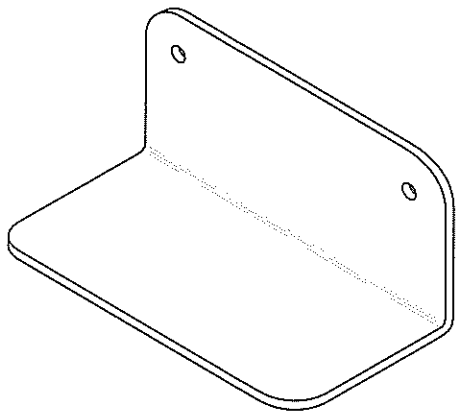
c. Ethylene Di-chloride

d. Methylene Chloride

26. When would you use an oven in preference to a strip heater for heating a sheet of acrylic?

The oven is used when the whole piece of acrylic needs to be heat softened for moulding.

27. The illustration on the right shows a simple bathroom shelf which is made from cast acrylic sheet.



List the tools, equipment and abrasives you would need to:

a. Prepare the flat sheet to the required size;

Bastard or second cut file, hand smooth file, rule, try square.

b. Shape the corners to a specified radius;

Rule, try square, wing dividers, coping saw, bastard or second cut file, hand smooth file.

c. Provide the means for fixing the shelf to the wall;

Centre punch, hammer, twist drill, drilling machine.

d. Finish the edges and bend to the required shape.

Wet and dry abrasive paper, buffing machine, strip heater, bending blocks or jig.

28. Briefly describe incorrect use of the buffing machine which could result in the piece of plastic being suddenly pulled from the operator's hands.

Working toward the upper end of the edge being buffed may cause the mop to grip the top corner and pull the work downward out of the operator's hands.

29. Does the mop (buff) on a buffing machine rotate toward the operator or away from the operator?

Toward the operator.

30. Briefly describe five safety requirements which should be observed when using the buffing machine.

a. *Secure loose clothing.*

b. *Protect eyes and face by wearing a face shield.*

c. *Keep hands clear of all moving parts.*

d. *Contact between work and mop must be below centre.*

e. *Operator only inside designated work area.*

31. Mops used for polishing the edges and faces of plastic sheet materials are usually dressed with a wax based dressing compound. What does the wax contain?

A very fine abrasive grit.

32. Would you remove the masking paper from a piece of acrylic sheet before working on it?

a. Yes (b.) No

33. Briefly explain you answer to question 32.

The masking paper should be left on as long as possible to protect the surfaces and to aid marking out.

34. 'Wet and dry' abrasive paper is often used to remove file marks from the edges of acrylic sheet. Briefly explain the reason why water is used in conjunction with the abrasive paper.

To prevent waste material from clogging the grit. The water washes the waste away allowing the abrasive to contact the surface being smoothed.

A WOODWORK DESIGN PROBLEM

SITUATION: Your polished silky oak study desk is usually cluttered with text books and you have been given an ultimatum. Keep it tidy or else!

BRIEF: It has been suggested that you put your woodworking skills to good use and make a matching portable book rack that can be placed on your desk and will hold all your text books.

List all factors in the 'situation' and the 'brief' which you should consider when designing your book rack. These design factors could relate to the needs of the project or instructions you have been given in the brief. Briefly list all factors in a manner similar to the example below.

(a) Must hold all the text books. (b) Must be portable (c) Must be constructed from silky oak (d) Must be finished with clear plastic (e) Must keep the books tidy (f) Must allow easy access to the books.

INVESTIGATION: When you have determined the needs of the project you must then decide how to meet these requirements. Investigate the following factors and write down any information you think may be helpful in designing your book rack.

Availability of timber: Is the timber you wish to use readily available?

a. Yes b. No *(Depends on locality)*

If 'yes' name the local timber merchant or hardware store where you can purchase the timber.

(Local business name)

If 'no' name a timber that is available and might be a reasonable substitute.

(Depends on locality)

List four stock sizes of dressed timber that are readily available and might be suitable for the project. Show also the current cost per metre for each size.

For example:

a. *140* x *12* $. b. *140* x *19* $. *(N.B. Prices will vary with locality)*

c. *68* x *12* $. d. *42* x *19* $.

Finishing Materials: List the brand name, size of the can required, price, and the name of a local supplier of a suitable clear plastic finish for the project.

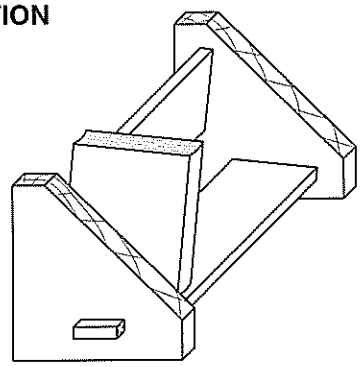
For example: Wattyl Estapol, 500ml can, (local price), (local supplier)

Overall Size: Assuming you have 5 books 20mm thick, 10 books 15mm thick and 4 books 25mm thick, determine the minimum total storage space required.

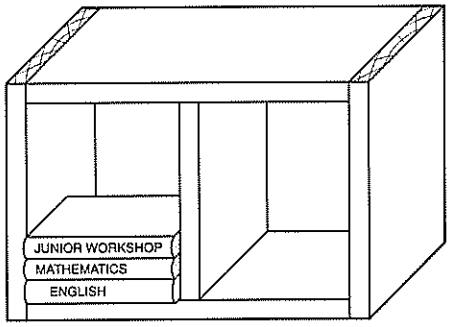
350 mm

Other Considerations: After considering other factors such as shape of the book rack, joining methods, availability of tools and equipment etc., you sketched two preliminary designs as shown below. Because of lack of tools and equipment you decide to construct your project using glued and nailed butt joints.

SOLUTION



Design A



Design B

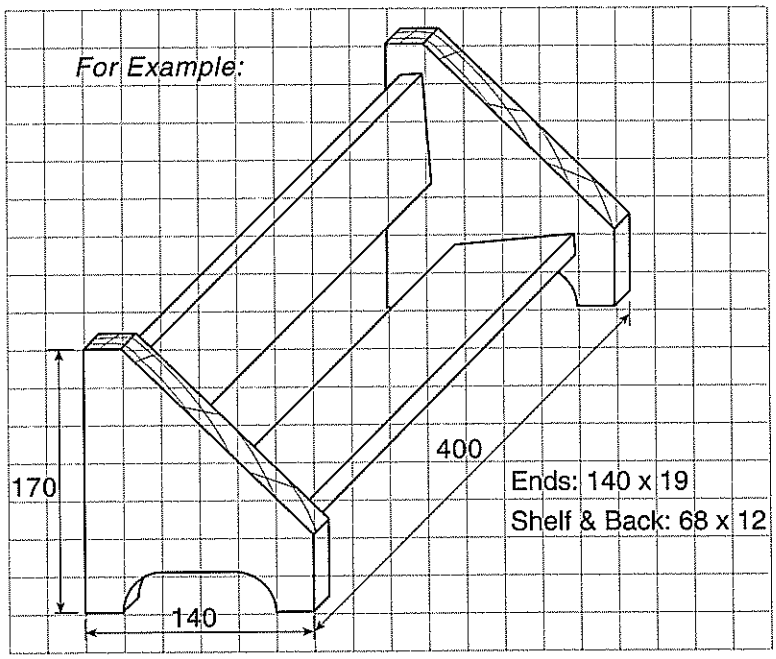
List the good points and the bad points of each design shown in the sketches.

Design A: *Books are easy to remove; handles are provided for portability; looks good; shelf and back are angled the wrong way allowing the books to fall out; etc.*

Design B: *Books would be difficult to select when the rack was full; no handles; box shape not very appealing; uses more material than design A, etc.*

Draw a neat sketch of your final design using the grid on the right.

Show material sizes and overall dimensions of the book rack.



REALISATION: Assume that you constructed the book rack according to the final design sketch.

EVALUATION: Briefly describe how your finished book rack satisfies the design brief. Mention all design factors referred to in the 'brief' and the 'situation'.

For example: The book rack

a. will hold all the books (12mm more than required space),

b. is portable (shaped ends allow it to be picked up),

c. has shelf and back angled so books will not fall out (tidy),

d. allows easy access to books,

e. is to be made from silky oak,

f. is to be finished with clear plastic.

Materials List:

List all materials used in the book rack. The timber list should show number, size and length of pieces required.

Timber: *2 pieces silky oak 140 x 19 x 170*

2 pieces silky oak 68 x 12 x 362

Finishing Materials: *Abrasive paper (medium and fine)*

Polyurethane clear finish

Coloured putty

Joining Materials: *PVA glue*

40mm nails

List all the tools and equipment you used in the construction of your book rack.

For example: Tenon saw, coping saw, try square, sliding bevel, rule, wing dividers, jack plane, half round file, hammer, nail punch, sanding block, paint brush.

ASSEMBLY AND FINISHING MATERIALS

1. Abrasive paper which is used for smoothing timber and other wood products consists of
abrasive materials in the form of grit bonded to a paper backing.

2. The abrasive material on garnet paper is:

a. a synthetic material.
(b.) a semiprecious stone.
c. extremely hard.
d. black in colour.

3. Briefly explain how the grit on garnet paper maintains sharp edges.
Garnet has a tendency to fracture and forms new cutting edges as it is being used.

4. Which is the finer grade of abrasive paper?

a. 80
(b.) 100

5. List four advantages of PVA glue.

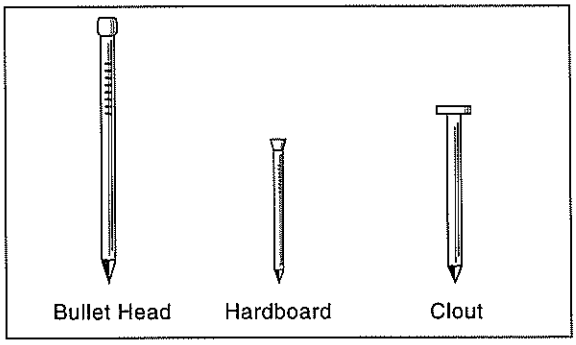
a. *Resists fungi*
b. *Good gap filler*
c. *Non-staining*
d. *Not flammable*

6. List two disadvantages of PVA glue.

a. *Not water resistant*
b. *Cannot bond non-porous surfaces*

7. PVA stands for *polyvinyl acetate* which is made by reacting *acetylene* with *acetic acid*

8. In the space provided on the right neatly sketch and name the following nails; bullet head, hardboard, clout.

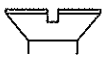


9. Briefly describe the use of a brad.
Used for fine nailing where the head can be punched and filled.

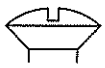
10. What is the purpose of the twisted thread on a particleboard nail?

The twisted thread provides more grip in the flaky structure of particleboard than bullet head nails.

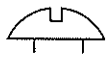
11. Name the three screw head types shown below.



a. *Countersunk*



b. *Raised*



c. *Round*

12. Briefly describe how you would sand a piece of timber that is to be given a clear finish.

A medium grade paper followed by a fine grade paper should be used with a sanding block working with the grain.

13. Name a plastic material used in the manufacture of a popular clear finish (varnish).

Polyurethane

14. Briefly describe the procedure for applying two coats of a clear plastic finish to a woodwork project.

The first coat should be thin and evenly applied, allowed to dry thoroughly then lightly sanded with a fine abrasive paper. All dust should be removed before the second coat is applied.

15. Name the solvent for 'oil based' paints and many clear finishes.

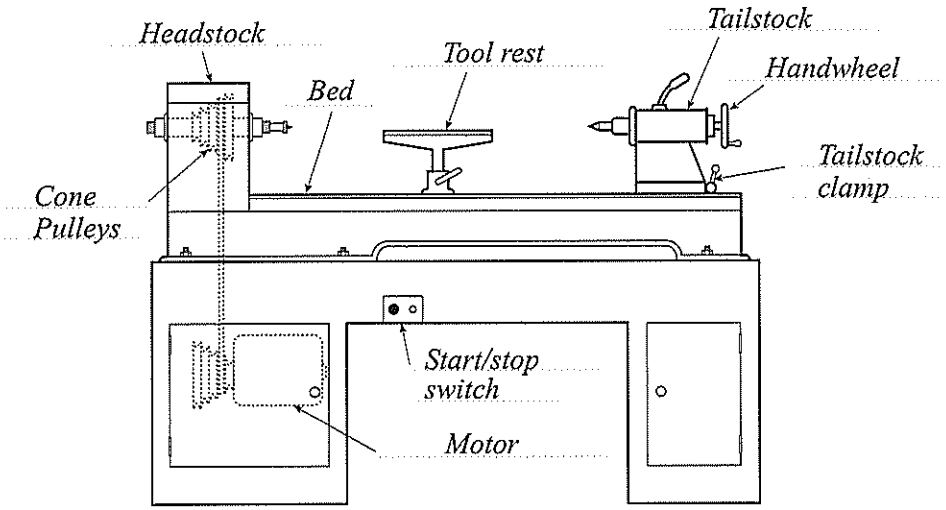
Mineral turpentine

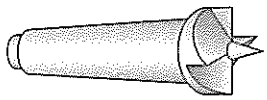
16. Why are stoppings used when a woodwork project is being finished?

Stoppings (putty) should be used to fill all nail holes and cracks so that a uniform finish can be obtained.

THE WOOD LATHE

1. Name the wood lathe parts, tools and accessories shown in the diagrams below. Neatly print the names in the spaces provided.





Spur centre

a. *Gouge*

Plain centre

b. *Skew chisel*

2. Briefly explain why saw cuts at right angles to each other are usually made in one end of a piece of timber which is to be turned between centres.

So the spurs on the spur centre can be easily tapped into the saw cuts to provide positive drive.

3. How should the tool rest be positioned in relation to the job when turning between centres?

Parallel to the job and as close as possible. Height should be adjusted so the cutting edge of the tool is on or above centre.

4. Briefly describe the main uses of the lathe tool 'a' shown in question 1 above.

The gouge is used for quick removal of waste and for most rough turning operations.

5. List three personal safety precautions that should be observed before you use the wood lathe. *For example:*

a. *Put on a face shield.*

b. *Secure loose clothing.*

c. *Restrain long hair.*

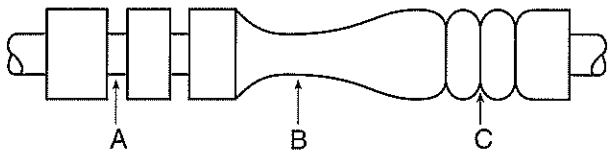
6. List three operating safety precautions that should be observed while you are using the wood lathe. *For example:*

a. *Hold the tool firmly on the tool rest.*

b. *Keep fingers clear of all moving parts.*

c. *Tool rest should be removed when sanding.*

7. Name the lathe tools you would use to finish the shapes shown in the diagram below.



A *Parting chisel*

B *Round nose chisel*

C *Spear point or skew chisel*

8. What is the main advantage of using a 'live' centre to support the tailstock end of a turning job?

Lubrication is not required because the cone centre rotates with the work.

9. Which lathe tool has its sides relieved so that it can be fed into the work with little side friction?

Parting chisel

10. Wood lathe tools can be classified into two groups; *scraping* tools and *cutting* tools.

11. Machines similar to the modern wood lathe were first invented during the Industrial Revolution.

a. True (b.) False

AN ACRYLIC DESIGN PROBLEM

SITUATION: You are a junior design technician employed by a plastics manufacturing company. Your company has been asked by the management of a large hotel chain to design and manufacture serviette rings for use in the hotel dining rooms.

The chief designer has decided that you should be given the job of producing a design that meets the customer's needs. He has asked you to sketch your ideas for his consideration and to produce a prototype for possible manufacture by the company.

BRIEF: The serviettes used by the hotel chain are folded and rolled into a cylindrical shape approximately 40mm in diameter. The serviette ring need not be circular but the rolled serviette must be able to fit neatly into the ring.

To enable dining room tables to be set neatly, it is necessary that serviette rings be made in such a way that they cannot roll or move easily.

So that costs can be kept to a minimum the chief designer has set a limit of 100 sq. centimetres on the amount of acrylic sheet that can be used to produce one serviette ring. The material from which the serviette rings are to be made is available in strips 20mm, 40mm and 60mm in width.

1. List four important design factors mentioned in the 'brief'.

a. *For example: The 'ring' need not be circular.*

b. *Must hold a serviette rolled to 40mm diameter.*

c. *Must not roll on the table or move easily.*

d. *The serviette must fit neatly into the ring.*

2. List three requirements for the material to be used in the project.

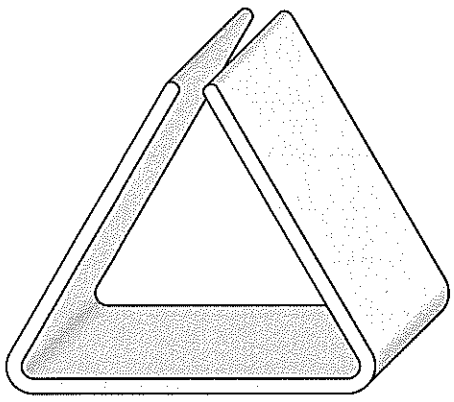
a. *Must be acrylic sheet.*

b. *Material limit is 100 square centimetres.*

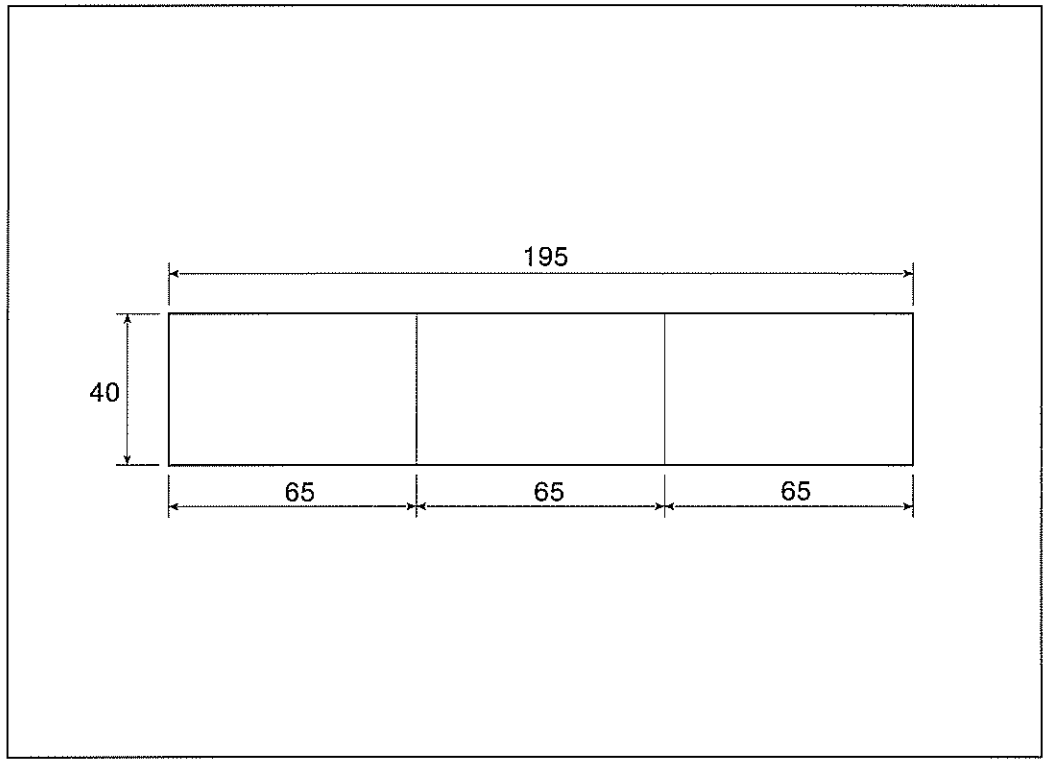
c. *Strips are available in 20, 40 and 60mm widths.*

3. Draw a neat sketch of your design for the serviette ring in the space below.

For example:



4. Draw the pattern development of the serviette ring you have designed. Show dimensions on the development.



5. Briefly explain how your design satisfies the four design factors and three material requirements listed in questions 1 and 2.

The flat base prevents rolling movement on the table. The size of the triangular 'ring' will hold the serviette firmly enough while allowing it to fit neatly. This design requires 78 square centimetres of acrylic sheet cut from 40mm strip.

6. Make up your serviette ring and have it assessed by the chief designer.

BUILDING BOARDS

1. Describe one effect that the introduction of particleboard in the early 1960's had on the cabinet making and joinery industries.

Panels which were previously framed and sheeted with plywood or hardboard could simply be cut from a sheet of particleboard.

2. The production of particleboard utilises:

a. thinnings and trimmings from pine plantations.
b. thinnings and trimmings from hardwood forests.
c. whole pine trees cultivated specially for the production of particleboard.
(d.) both 'a' and 'c' above.

3. Particleboard consists of wood flakes or chips:

a. which are all uniform in size.
b. of varying size distributed evenly throughout the sheet.
c. compressed with the smaller flakes sandwiched between outer layers of coarse flakes.
(d.) compressed with the coarse flakes sandwiched between outer layers of fine flakes.

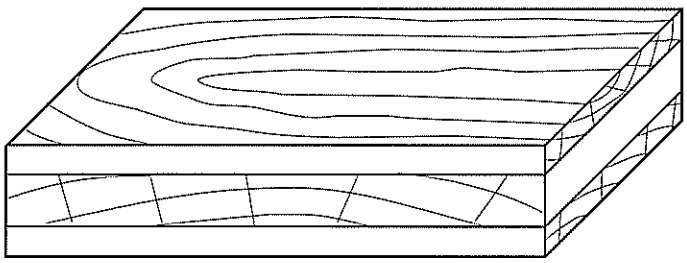
4. Particleboard has no grain direction. How does this affect the strength and rigidity of the sheet?

Strength and rigidity are evenly distributed throughout the sheet.

5. The two most common methods of cutting veneer used in industry today are

Rotary cutting and *Slicing*

6. Neatly sketch the end grain of the three layers which make up the piece of plywood represented in the enlarged diagram below.



7. Briefly explain the reason why the layers in plywood should be assembled with the grain lying in the direction you have illustrated in question 6.

Bonding alternate layers with the grain direction at right angles produces a very strong material with the strength evenly distributed throughout the sheet.

8. Hardboard is manufactured from:

a. pine chips which are compressed much harder than in particle board.
b. a mixture of softwood and hardwood chips.
(c.) hardwood chips processed mainly from eucalyptus.
d. a fibrous substance left after sugar cane is crushed.

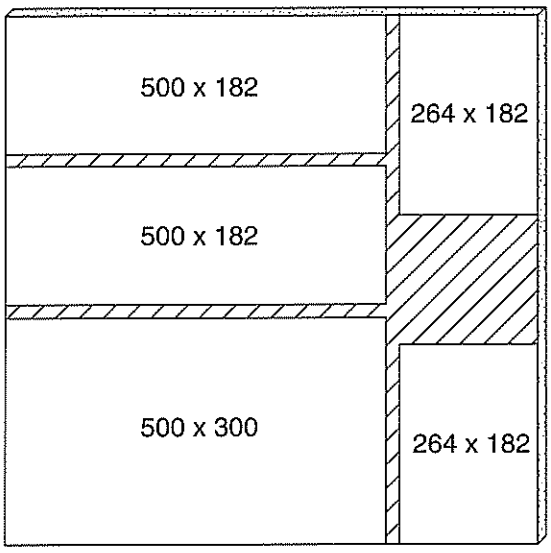
9. The fibrous texture of medium density fibreboard is:

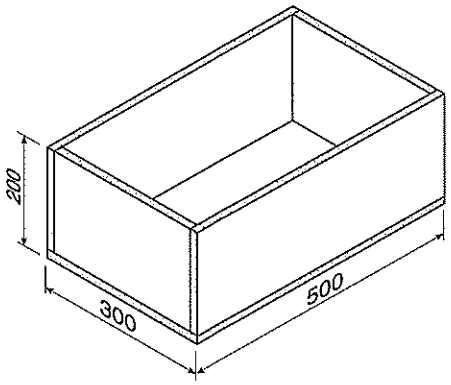
a. coarse and uniform throughout the sheet.
b. a mixture of fine and coarse particles evenly distributed throughout the sheet.
c. a mixture of fine and coarse particles unevenly distributed throughout the sheet.
(d.) fine and fairly uniform throughout the sheet.

10. The pictorial drawing below shows a box made from 18mm particleboard.

a. Determine the number and finished size of pieces required to construct the box, then complete the materials list below.

b. Also shown below is a sketch of a sheet of 18mm particle board 700mm x 700mm drawn to a scale of 1/10. Using the same scale mark out on the sheet all pieces required to construct the box.





No.	Finished Size
2	*500 x 182*
2	*264 x 182*
1	*500 x 300*

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