CHAPTER 6

Reading a Drawing and Making a Shop Sketch

A drawing can say many things. It can tell you how to find someone's house or where a city is located. A drawing can also tell you how to build a project. The drawing will tell you how big each part is, what the material is, what shape each part is, and how the parts go together. When you make your own design, it shows how the finished article should look; so there is no guessing to do. Before you can use a drawing though, you will have to know how to read it. The drawing is your guide. It tells you everything you need to know about the project. Fig. 6-1.

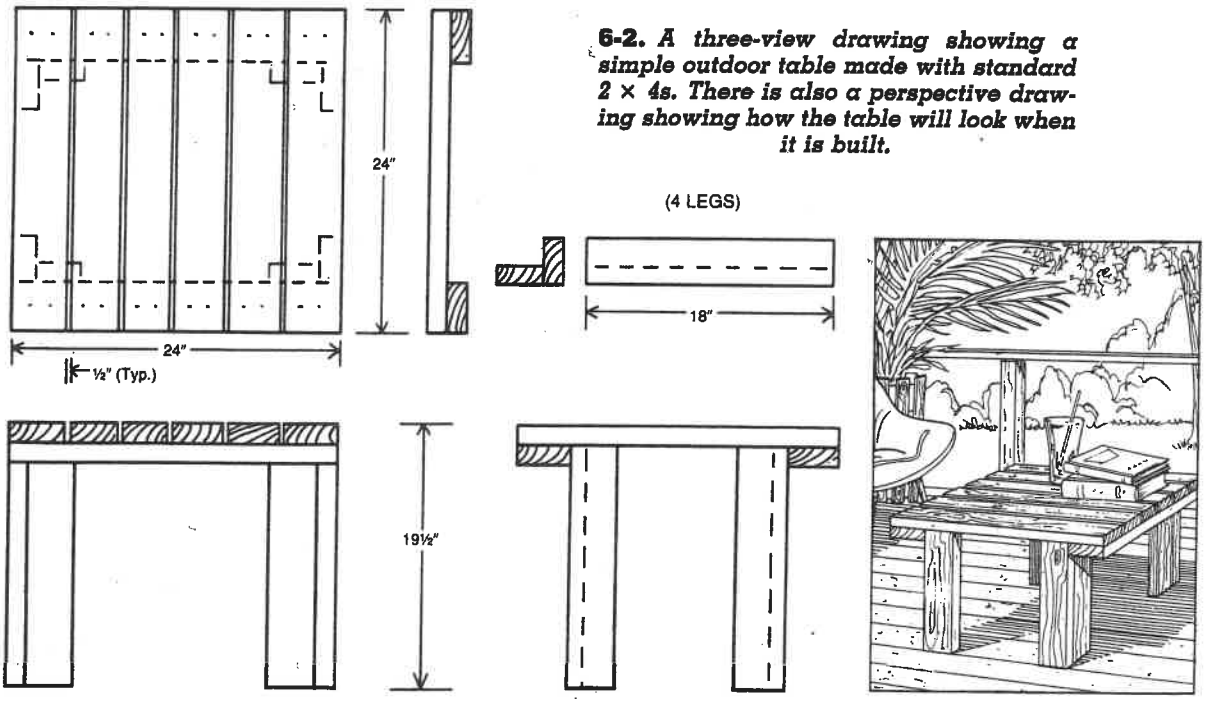
This chapter will tell you how to read a drawing. It will also explain how to make a sketch. If you have already taken drawing and sketching, the following will be a review.

6-1. ***Learn to make and use a drawing to build a project.***

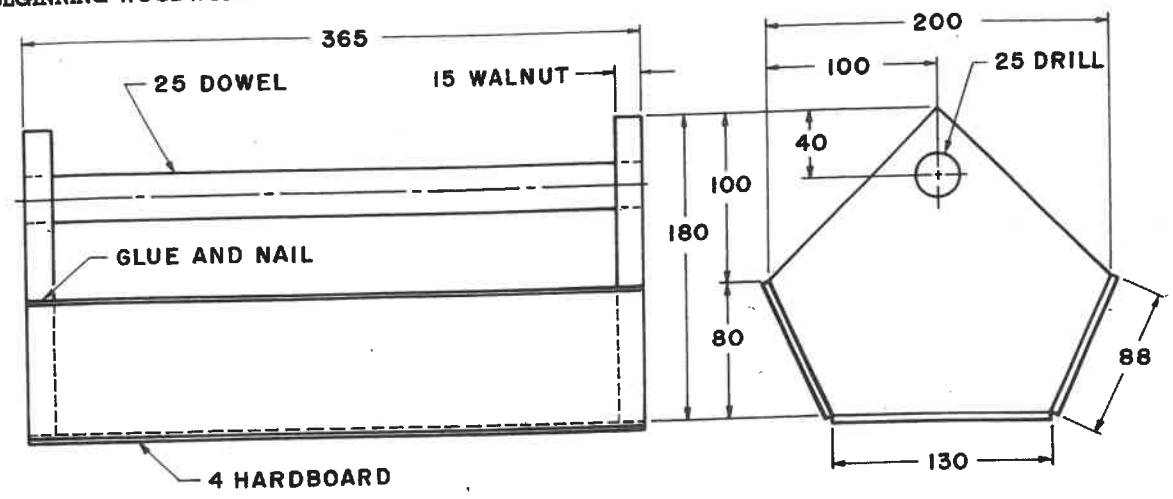
DRAWINGS USED IN WOODWORKING

As you look through this book, you'll see that most drawings are *working drawings.* These are also called *view drawings.* They have two or more views (usually three) of the project. Figs. 6-2 and 6-3. The most common views are the front, top, and the right side (end). Many drawings found in magazines are *pictorial drawings.* Pictorial drawings look more like a picture of the object. The two most common pictorial drawings are *isometric* and *cabinet drawings.* Figs. 6-4 and 6-5. Notice that both of these drawings show how the project will look when it is completed and the size and shape of each part. Sometimes even a *perspective drawing* is used. Fig. 6-2.

Woodworking drawings differ. A drawing of a project will often be made partly as a view drawing and partly as a pictorial drawing. Then, too, when view drawings are used, the views are not always placed correctly. That is, the right side, or end, view isn't always to the right of the

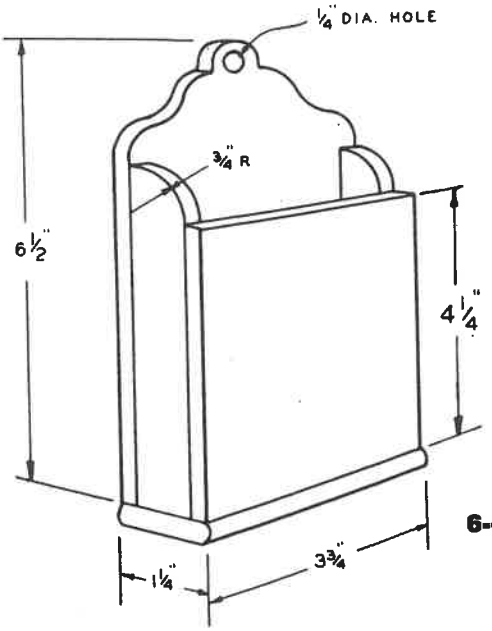


6-2. ***A three-view drawing showing a simple outdoor table made with standard 2 × 4s. There is also a perspective drawing showing how the table will look when it is built.***



6-3. ***Only two views are needed of this tool box. Note that the sizes are metric.***

front view. You'll also find many drawings made as *exploded* (taken apart) views. This kind shows each part more clearly and also shows how the parts fit together. Fig. 6-6.

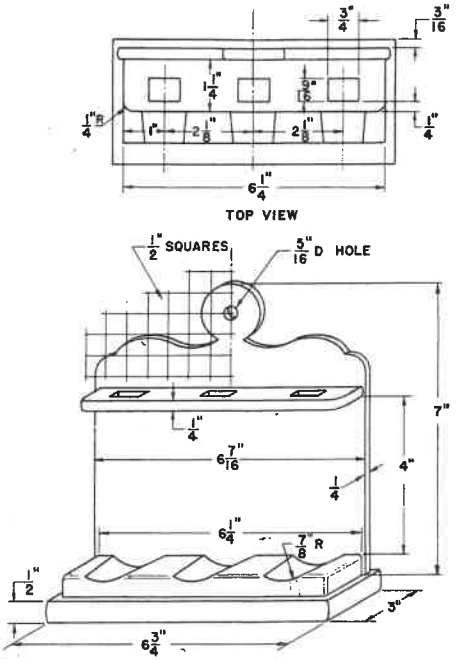


6-4. ***An isometric drawing of a card holder.***

KINDS OF LINES

Lines show the shape of each part. Different kinds of lines have different meanings. Fig. 6-7.

- *Visible (object) lines* show all edges or surfaces that can be seen. They are solid, heavy lines.
- *Hidden (invisible) lines* show hidden edges. These are broken lines.
- *Center lines* are used to show the centers of arcs and circles and to divide an object into two equal parts.
- *Extension lines* stick out from the drawing. Between these lines the sizes of each part can be shown.
- *Dimension lines* usually have arrowheads at one or both ends and are broken in the center. The dimension figure (size of the part) is written in the gap of the dimension line. The dimension lines and figure are usually placed between the extension lines. Sometimes there is not enough room within the extension lines. Then the dimen-



6-5. ***A cabinet drawing of a pipe rack.***

sion lines and the figure are placed outside the extension lines. See Fig. 6-5.

DIMENSIONS

Dimensions tell you the sizes of things. These dimensions must be followed in writing a bill of materials and in building the project. There are four common ways by which dimensions are added to drawings:

1. **Customary (inch) drawings** are dimensioned in inches and fractions (parts) of an inch. Sometimes the inch marks (″) are placed after the dimensions to show that the sizes are in inches.

2. **Metric drawings** are dimensioned in millimetres. Fig. 6-3.

3. **Dual-dimensioned drawings** show both the inch and millimetre dimensions. Sometimes the inch dimensions are first and sometimes the millimetre dimensions are. Figs. 6-8 and 6-9.

4. A **readout chart** can be used. Either metric or inch dimensions are shown on the drawing. A readout chart is added showing the dimensions in the other system. Fig. 6-10 (page 64).

SCALE

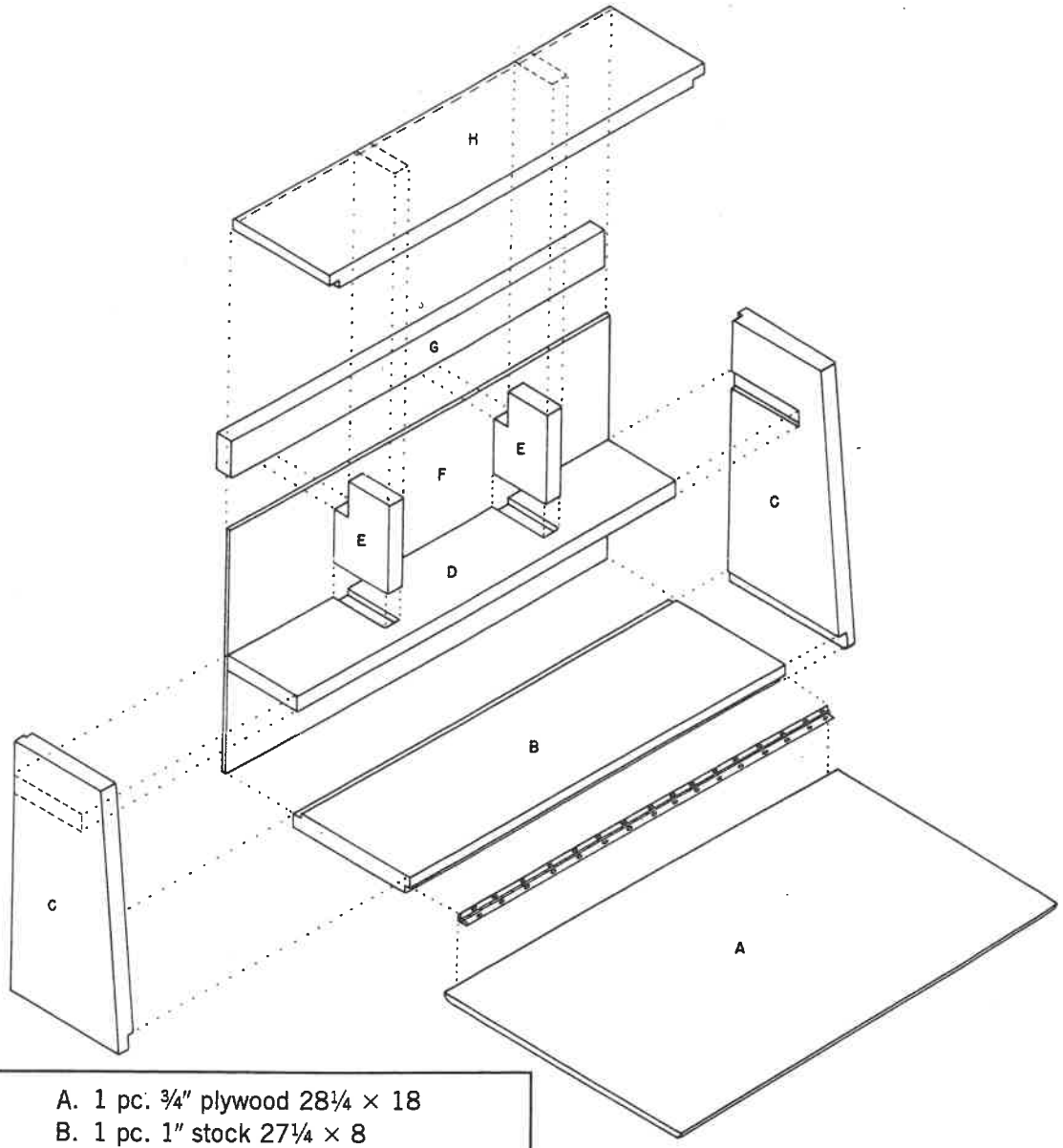
Nearly always a woodworking project is too big to be drawn full size on a piece of paper. Very large projects must be drawn smaller so that they can fit on standard-size paper. Drawings made larger or smaller than full size are called *scale drawings*. For example, if the part is 8 inches long and you draw it 4 inches long, you are using a scale that is *half size* (6 inches equal 1 foot). Other common scales are: *one-fourth size* (3 inches equal 1 foot) and *one-eighth size* (1½ inches equal 1 foot). If even larger projects must be drawn, a scale such as ¼ inch to the foot (¼″ = 1′0″) may be followed, as in house plans.

On metric drawings, the common scales for reducing the size are 1:2 (half size), 1:5 (one-fifth size), 1:10 (one-tenth size), and 1:20 (one-twentieth size). In drawings of buildings, a scale of 1:50 or 1:100 is often used.

READING A DRAWING

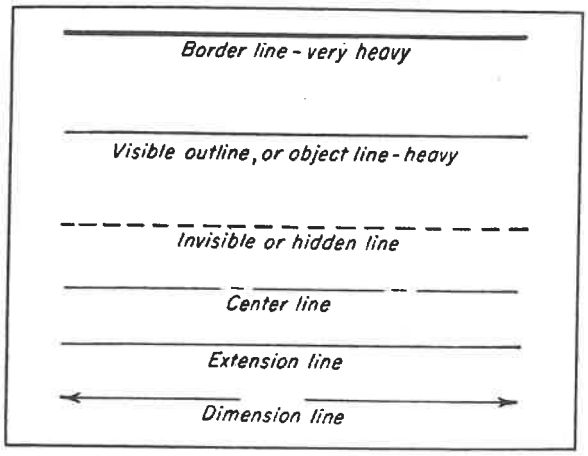
In Fig. 6-11 you see the kind of project you might make in the wood shop. Find the answers to these questions by reading the drawing in Fig. 6-11(a).

- How many parts are there in this project? (Count the dowels, too.)
- What is the thickness of the back?
- What is the length of the back?
- What is the diameter of the dowels?
- At what angle are the dowels attached to the back?
- What is the diameter of the holes for mounting the rack?
- How far in are the dowels placed from the ends?
- What is the distance between the dowels?



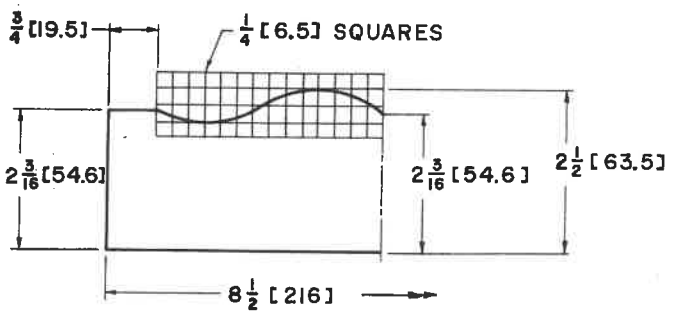
A. 1 pc. ¾" plywood 28¼ × 18
B. 1 pc. 1" stock 27¼ × 8
C. 2 pcs. 1" stock 15¾ × 8
D. 1 pc. 1" stock 27¼ × 5
E. 2 pcs. 1" stock 5¾ × 4
F. 1 pc. ⅛" pegboard 27⅛ × 15 ¼
G. 1 pc. 1" stock 26½ × 2¼
H. 1 pc. 1" stock 28 × 7

6-6. ***An exploded isometric drawing.***



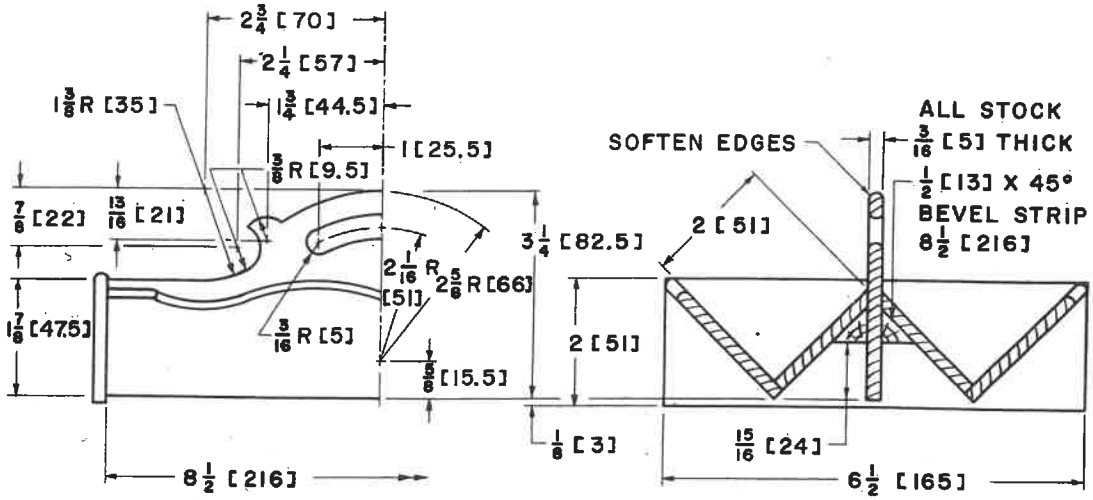
6-7. *These are some of the lines used in drawing. The border line is used around the drawing to "frame" it.*

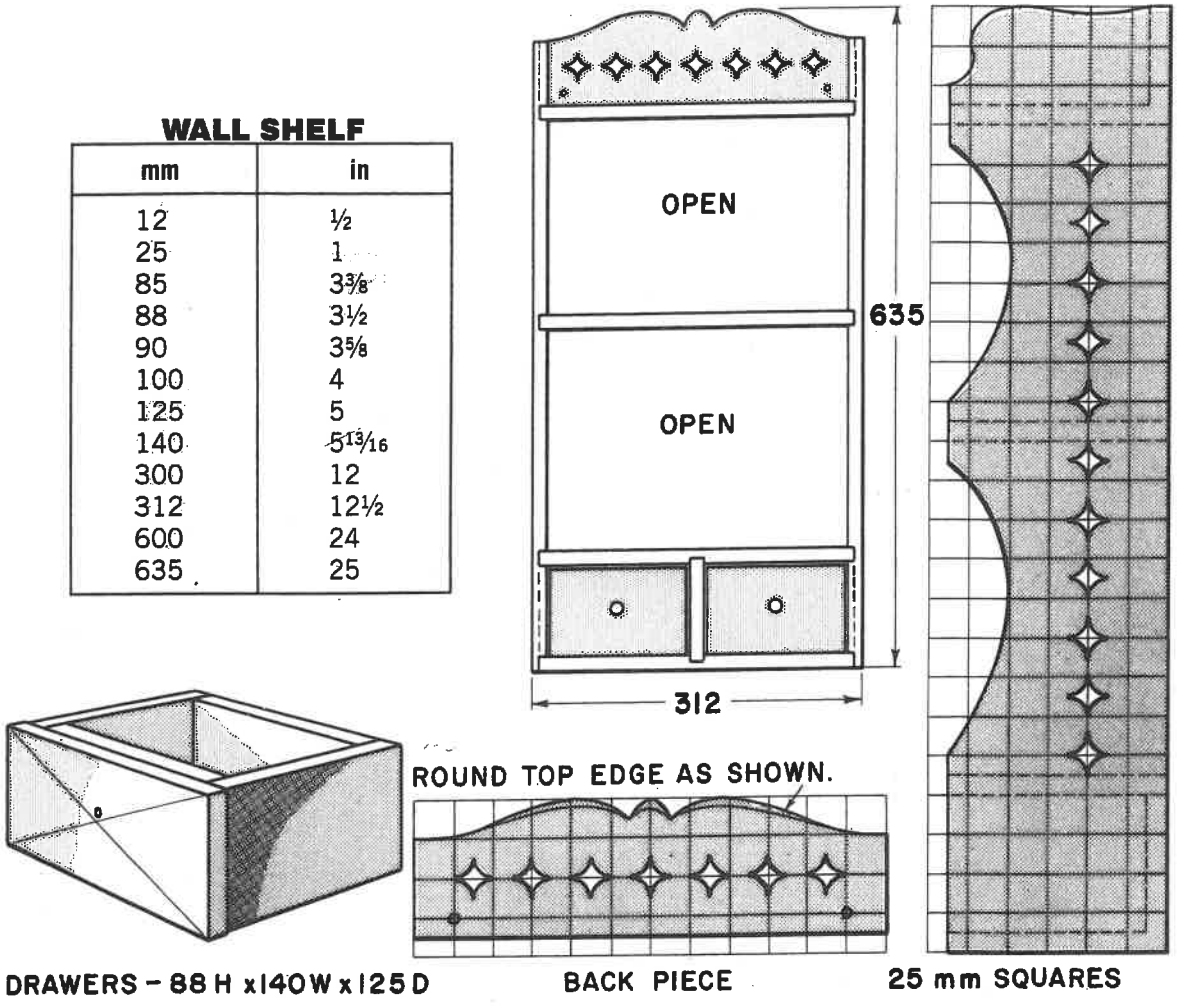
6-8. *Cracker tray.*



6-9. *The drawings for the cracker tray are dual dimensioned. The inch measurements are given first, and the millimetre measurements are in brackets.*

DIMENSIONS IN INCHES [mm]





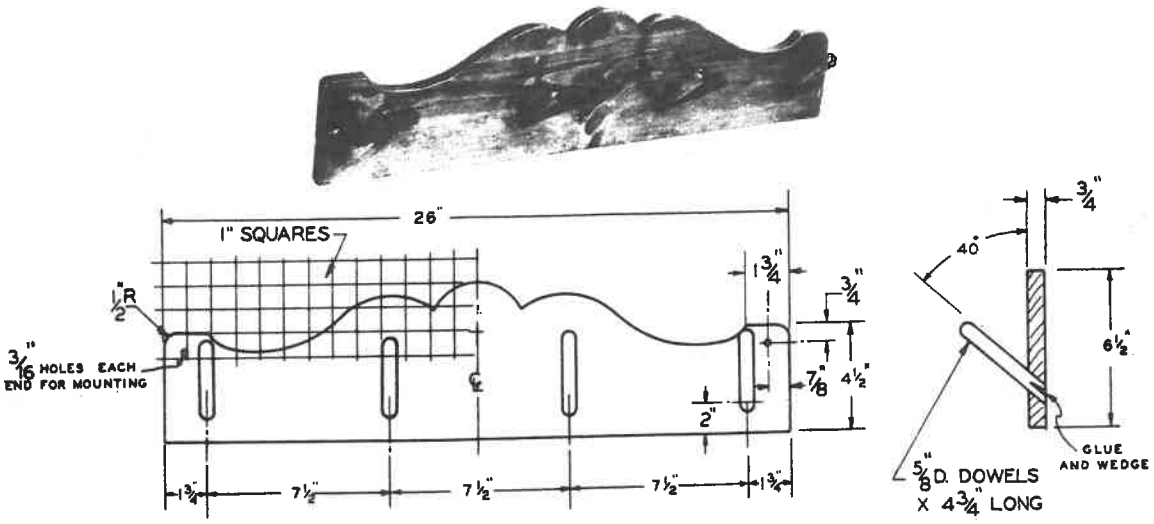
6-10. ***This wall shelf is dimensioned in millimetres. A customary readout chart makes it easy to convert from millimetres to inches.***

MAKING A SHOP SKETCH

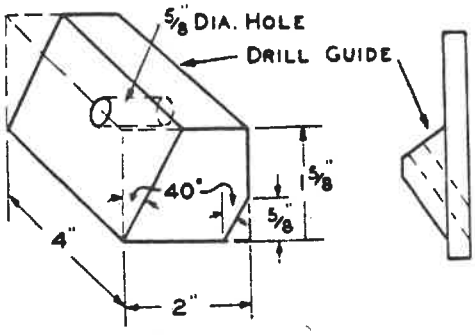
A *shop sketch* is just a very simple drawing of a project made on ruled drawing paper. Sometimes you will find an idea you want to use in a book or magazine in the library. Perhaps you'll find a suggestion in your own book that you like but want to change a little. You might want to use an idea of your own also or sketch something you have seen. Whatever its source, you will need to get the idea "on paper" so that you can see what it will look like. A shop sketch is needed for planning and building anything.

For making the shop sketch, you need the following materials.

- A No. 2 writing pencil or an HB drawing pencil.
- Squared or cross-sectioned paper that is lined



6-11(a). ***A photograph and working drawing of a hat and coat hanger. Can you answer the questions by reading the drawing?***



6-11(b). ***A drill jig (guide) used for drilling the angle holes in the hanger.***

BILL OF MATERIALS
Stock: Pine

IMPORTANT: All dimensions listed below are FINISHED size.

No. of Pieces	Part Name	Thickness	Width	Length
1	Back	¾"	6½"	26"
4	Pegs	⅝" dia.		4¾"
4	Wedges	0"-⅛"	⅝"	¾"

6-11(c). ***Materials needed for the hanger.***

PLAN OF PROCEDURE

1. Cut back to size on circular saw.
2. Lay out irregular surface and cut out on band saw or jigsaw. Sand edges with drill press drum sander.
3. Drill mounting holes.
4. From a scrap piece of 2 × 4, make guide for drilling holes in hanger back. Dimensions for guide are shown in Fig. 6–11(b). Clamp guide to hanger back, and drill the peg holes.
5. Smooth back and soften edges with sandpaper.
6. Purchase ⅝-inch dowel or turn pine on lathe to ⅝-inch diameter. Cut four pegs to length of 4¾ inches. Cut ¾-inch deep slot in base end of pegs to receive wedges. Round top end of pegs.
7. Cut four wedges to size.
8. Glue and wedge pegs into back.
9. Trim projecting pegs and wedges and sand even with rear of back.
10. Finish sand entire project.
11. Apply antique pine finish.

6-11(d). ***The steps for making the project.***

in squares or dots, eight to the inch. These squares or dots help you to draw the plan to the correct size and to keep your lines straight.

- A pencil compass may be used for drawing circles and arcs (parts of circles). However, you can sketch these *freehand* (with no instruments, just a pencil).
- A shop rule or a straightedge for drawing straight lines.

Here's how to make a shop sketch:

1. Decide on the views you'll need to build the project. Sometimes one view is enough. For example, if it's a one-piece project, such as a cutting board, only the top view is needed. A little note on the sketch can tell you the thickness of the *stock* (wood). At other times, you'll have to make two or three views.
2. Decide on the scale to use. In your first attempt, make the drawing full size, if possible. This is simplest. Maybe you'll need to use more than one piece of cross-sectioned paper to do this. But for all needs, with paper having eight squares to the inch, the following scales are easiest:

- Full size. Each small square represents (stands for) ⅛ inch, and so each large, dark-lined square represents 1 inch.
- Half size. Each small square represents ¼ inch and each large square equals 2 inches.
- Quarter size. Each small square represents ½ inch and each large square equals 4 inches.
- Eighth size. Each small square represents 1 inch and each large square represents 8 inches.

For example, suppose you want to draw the house numbers shown in Fig. 6-12. Notice that the back is 6 inches wide and 16 inches long. You couldn't make this full size, so half size would be best. Always make the drawing as large as possible. Each small square in this case will represent ¼ inch.

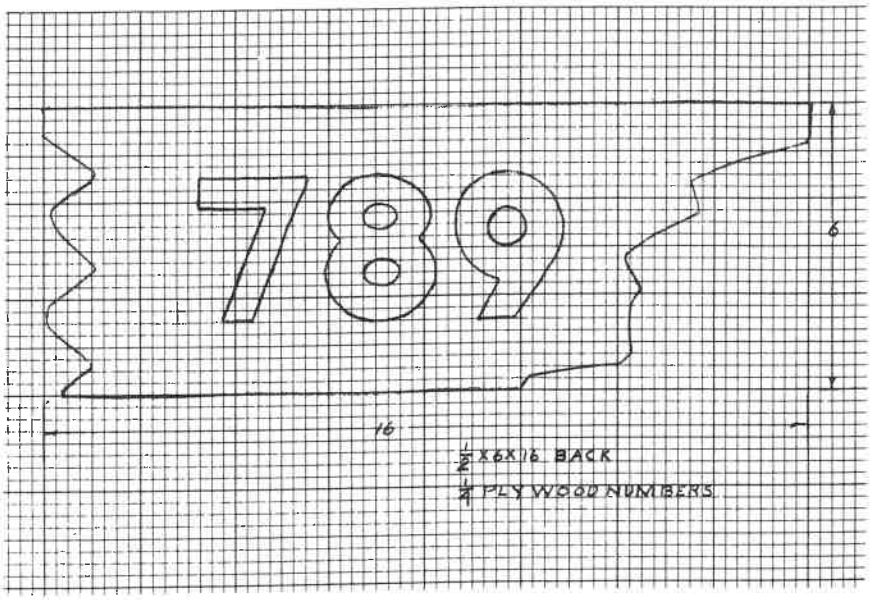
3. Start in the lower left-hand corner of the paper about 1 inch up and 1 inch in. Mark a dot.
4. Count off eight large squares from left to right. (Each large square equals 2 inches.) Mark a dot.
5. Count off three large squares up. Mark a dot.
6. Notice that the ends are irregular. Mark off three large squares from the lower right-hand corner. Draw any free (irregular) line to the upper right-hand corner. Also draw an irregular line on the other end.
7. Then draw the lines to complete the outline.
8. Now draw in the numbers of your house.
9. Add a note for the size of stock.

To make a sketch with metric dimensions, use metric cross-sectioned paper. Metric cross-sectioned paper has 1 mm squares covering the surface, with every five squares in slightly darker lines. It is easy to use any scale. For example, each square can represent 1 mm for a full-size sketch or 2 mm for half size. You can also use cross-sectioned paper with 20-mm or 25-mm squares. Fig. 6-13.

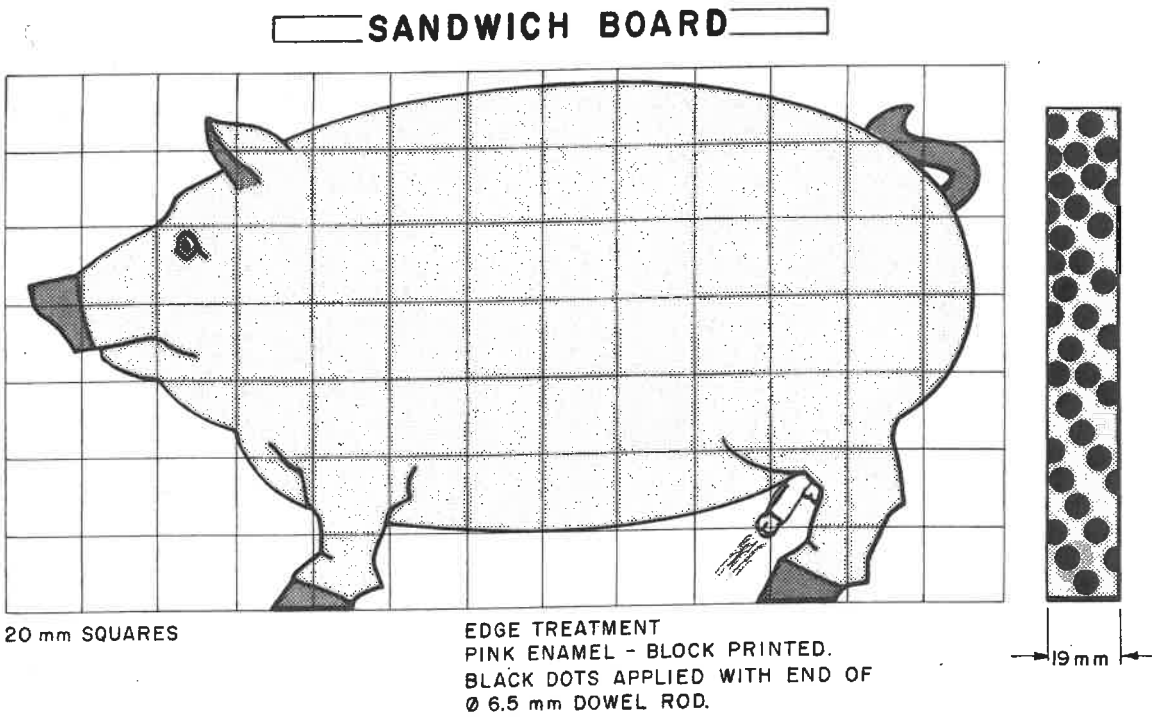
DESIGNING IN THE METRIC SYSTEM

A soft conversion to metric dimensions can yield some awkward numbers. Since the soft conversion is only a mathematical change, the metric sizes may be very odd. For example, if the original dimension is 1", then the exact metric equivalent is 25.4 mm. This is hard to measure on most metric rules. To be truly metric, a project should be designed in the metric system, using the more common full numbers like 5, 10, 15, 20, and 25 mm.

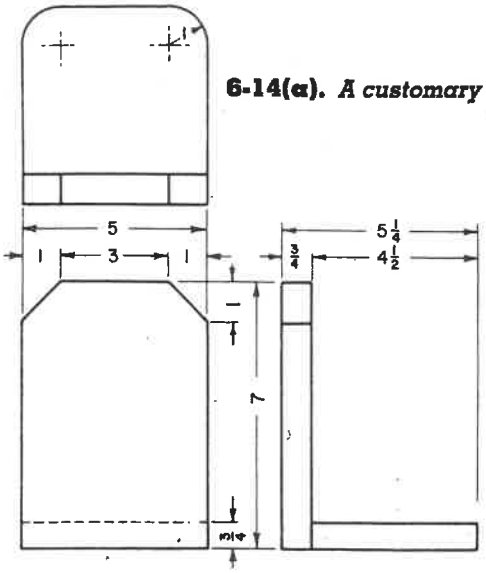
When designing a product to metric measurements, it is handy to have a dual-reading metric rule. Begin to think about replacement sizes, not soft conversions. For example, if you are designing bookends, you will find that a 5" customary width is about right. But suppose you are designing metric bookends. What do you do? Look at the dual-reading rule. You will see that 5" converts to about 127 mm. That size could be rounded off to 125 mm. Because 125 mm is easier to read on your rule and more convenient to use, it's called a "rational" size. Fig. 6-14.



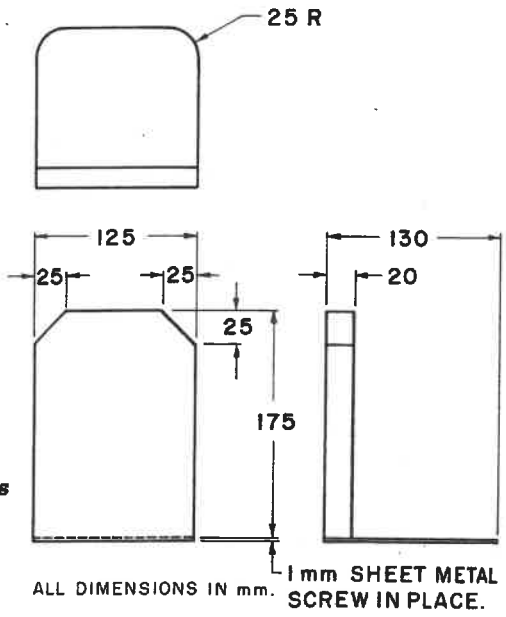
6-12. ***A shop sketch of house numbers.***



6-13. ***This sandwich board is designed in metric measurements.***



6-14(a). *A customary drawing of a wooden bookend.*



6-14(b). *A metric drawing of a bookend. This bookend is made from wood and metal.*

QUESTIONS

1. What are the three views usually shown in a working drawing?
2. Name three kinds of pictorial drawings.
3. What are dimensions?
4. Why do you need dimensions on a drawing?
5. What is a scale drawing?
6. Tell how to make a shop sketch. ← DON'T DO