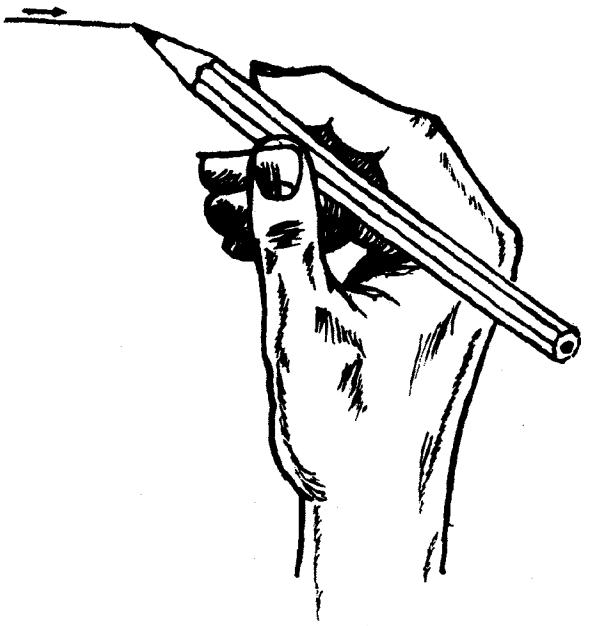
Introduction to Freehand Sketching

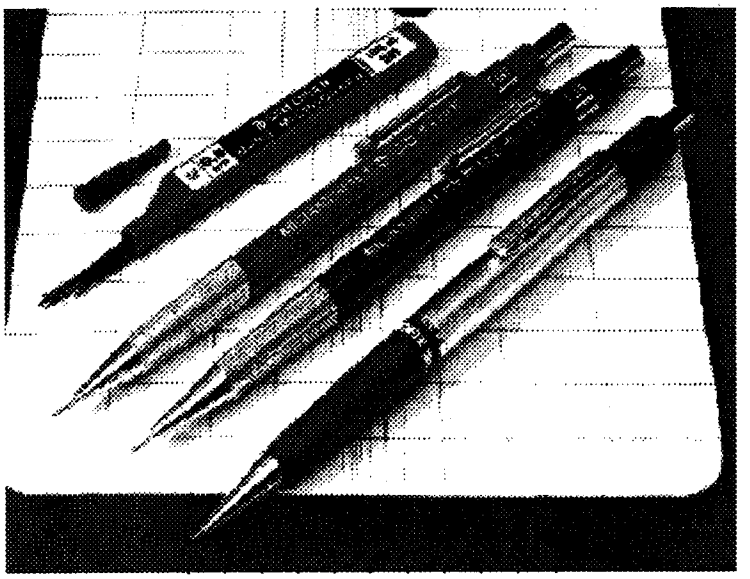
Sketching is a very important technique for technical communication. Sketches can transfer ideas, instructions and information in a clear, concise form. "Thinking with a pencil" is a practice designers use to bring ideas and mental pictures to reality. Freehand sketches are often the first view of new designs. Long before formal drawings are made or computer models are created, a series of detailed sketches are analyzed and approved.



Sketching is a personal skill which everyone can improve.

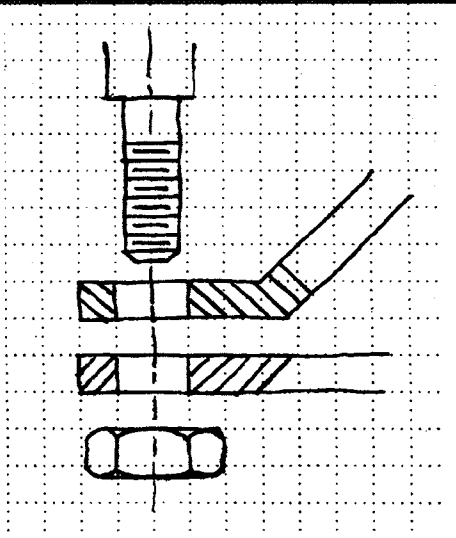
Sketching tools include:

__Pencil or leadholder.
__Leads: "H", "F" or "HB" hardness.
__Eraser: pink type preferred or white.
__Sketching paper: rectangular grid, isometric grid, vellum overlay, newsprint, etc.
__Straightedge.
__Circle and ellipse templates.
__Plastic triangles.
__Gadgets like tiny drafting machines, roller parallel tools, etc.



Designers may use a variety of these tools when many sketches are to be made. Since sketches may be needed quickly, it is best to rely only on pencil, paper and eraser.

Printed grids or papers with lightly ruled lines are often used for sketching. The grids are used to keep freehand lines straight. Grids may also be used to create accurately scaled sketches, keeping the drawing in correct proportion.

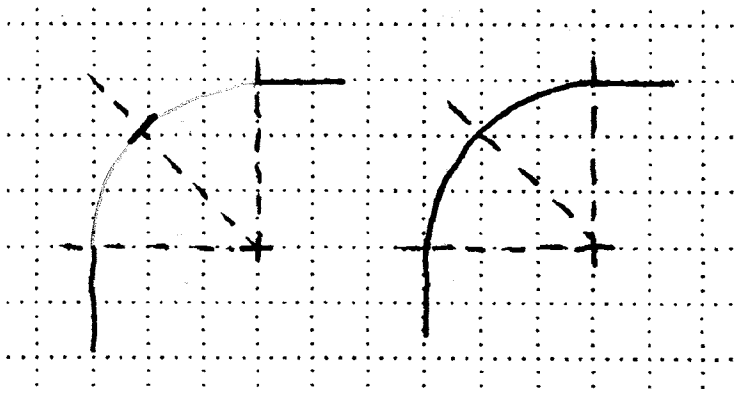


Grids act as guides for sketching. They help keep lines straight and in correct proportion.

Using Sketching Grids

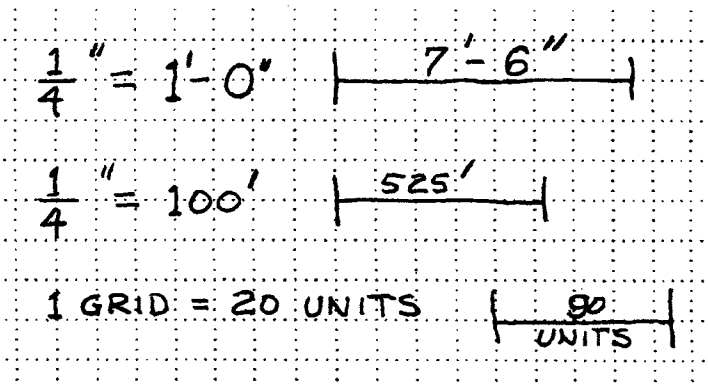
Grids may be used to keep features in correct X - Y scale. The rounded corner is measured three units horizontal, three units vertical and a construction point is measured half-way around the arc.

Sketches must be very neat and proportional to the real objects.



Engineering and architectural forms are available with many guide line spacings. 1/4 inch forms are common. Sketches of objects may be scaled down (or up) to fit the sheet size. The examples show several possible scale factors.

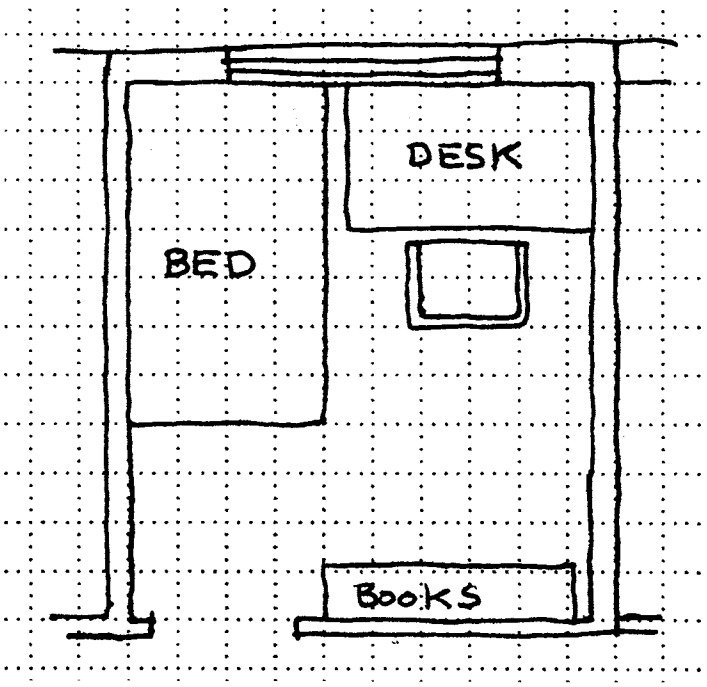
Accurately scaled sketches are needed to convey proportions.



This sketch of a small room is drawn to a scale of 1/4" = 1'-0". It indicates the room is about 9'-6" wide by 11'-0" deep. The bookcase is 14" deep and 5' wide. Other furnishings are sketched to scale.

Scaled sketches are often the first step in working out the sizes and proportions for a design.

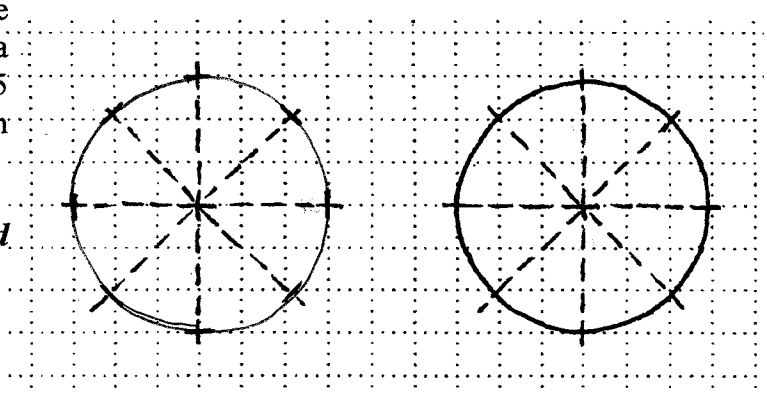
Sketches may be created anywhere and at any time with a minimum of tools. Neat sketches convey accurate information. Professionals take pride in the appearance and accuracy of their sketches.



Sketching Arcs and Circles

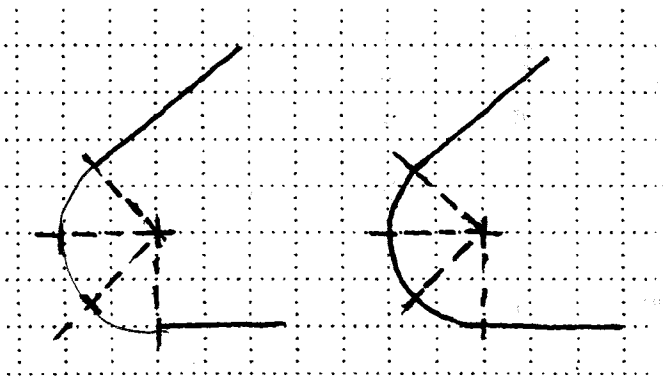
Construction lines and points will improve the appearance of freehand circles. It takes only a few seconds to block in horizontal, vertical and 45 degree points shown. These points help when sketching the arcs for the circle.

The edge of a piece of paper may be used as a gage for measuring points on a circle.



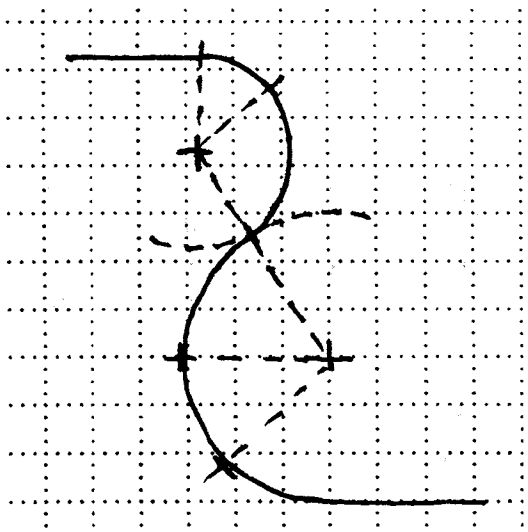
Tangent points define the extent of an arc. Tangent points are located by sketching a line from the center of the arc or circle perpendicular to the tangent line. These points show where the arc ends and the straight line begins.

Locating tangent points will improve the appearance of sketches.

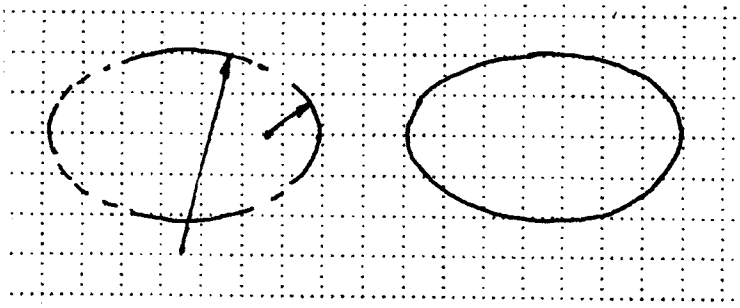


When two circles are tangent, the tangent point s on the line connecting the centers. This point shows where one arc ends and the other begins.

There are only two rules to remember when locating tangent points:
1. The point of tangency between a line and a circle is on the line perpendicular through the center of the circle.
2. The point of tangency between two circles is on the line connecting the centers of the circles.



Ellipses may be sketched using four arcs. Sketch a small arc at each side and a longer arc across the top and bottom.

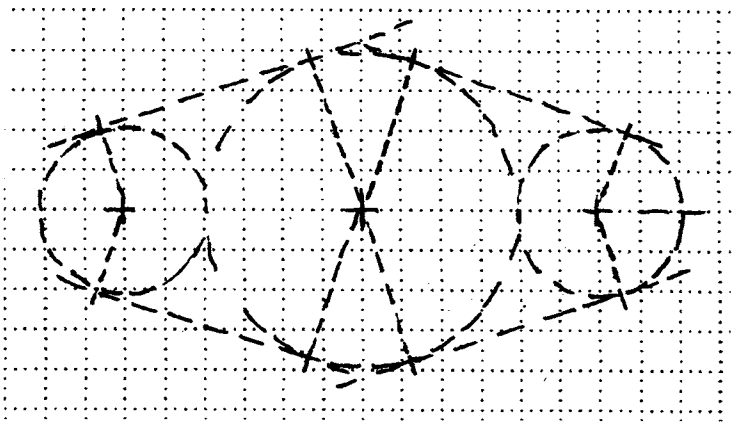


Sketching Techniques

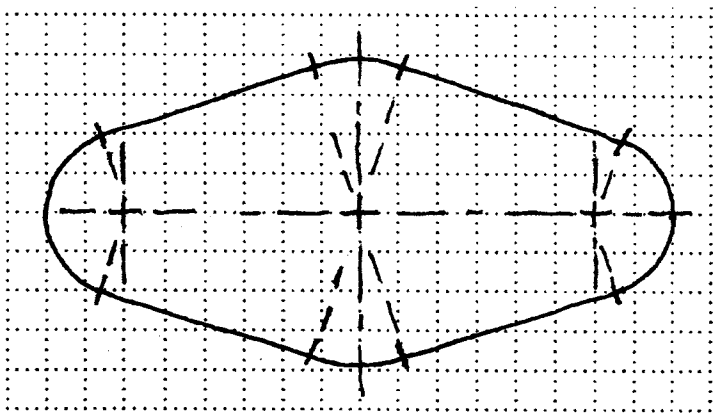
Block in the entire circle even if only a part of the circle will be needed. This helps space the object and verify proportions.

__Sketch the three circles.
__Sketch the lines tangent to the circles.
__Sketch each radius perpendicular to each tangent line.

These constructions will locate points needed for darkening-in the final shape.

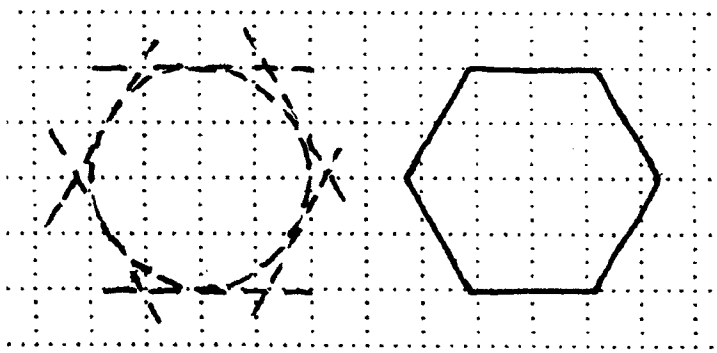


The final shape is sketched by pressing down hard on the pencil to create a smooth black outline.



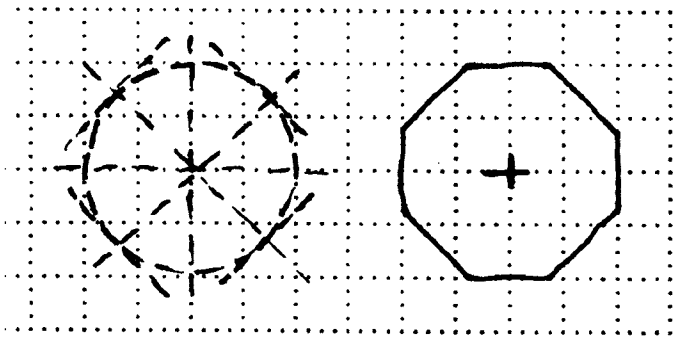
Geometric shapes like this hexagon are based on first sketching a circle. Draw the hexagon using the circle as a control surface. Construct tangent lines at approximately 60 degrees (in this case).

Blacken the lines for the final shape.



An octagon has eight sides.

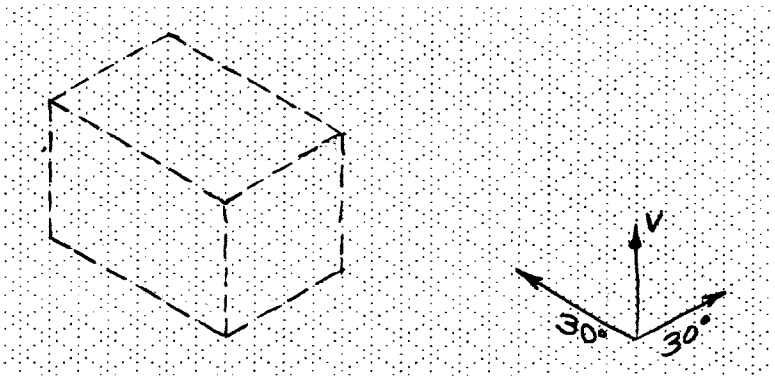
__Sketch a circle.
__Sketch horizontal and vertical lines tangent to the circle.
__Sketch lines from the center of the circle at 45 degrees. (Use the diagonals of the grid boxes.)
__Sketch lines perpendicular at each diagonal.
__Blacken-in the octagonal shape.



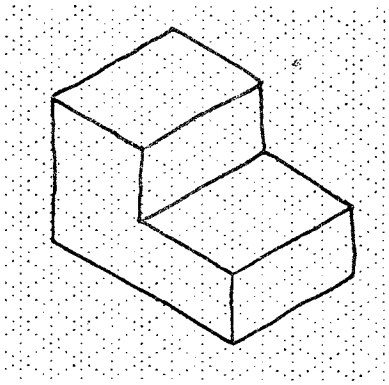
Pictorial Sketches

Pictorial sketches are easier if an isometric sketching grid is used. By following the angles of the guide lines, the shape of the front, top and side faces may be sketched.

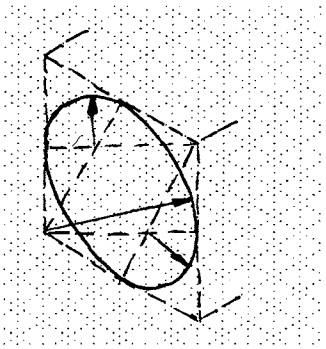
Isometric axes are 30 degrees upward to the left (width), 30 degrees upward to the right (depth) and vertical (height).



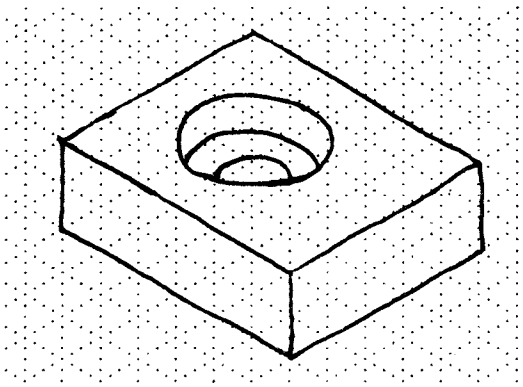
Pictorial sketches show three faces of a three dimensional object. This type of sketch helps designers and viewers portray three dimensional shapes quickly.



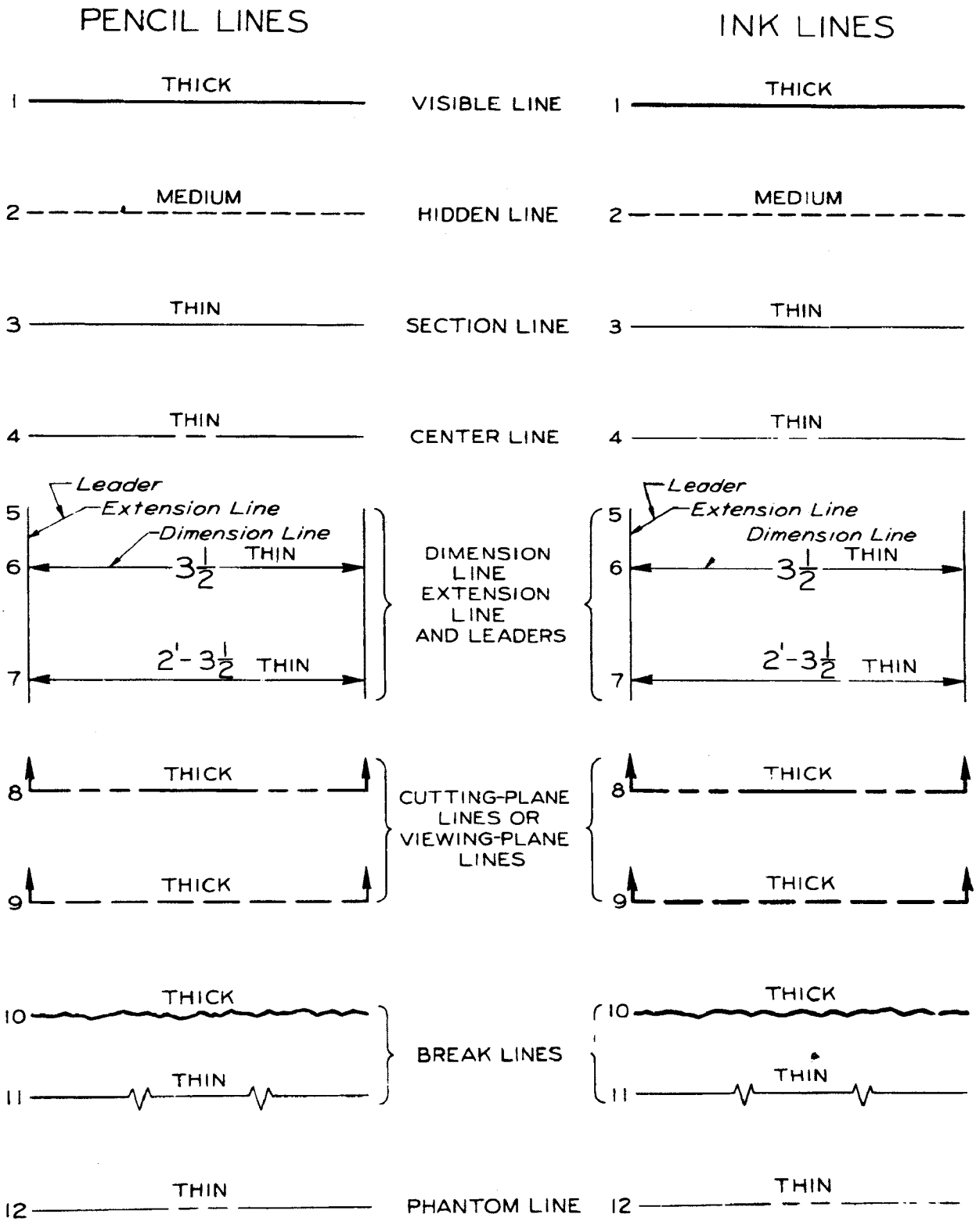
Circular shapes appear as ellipses on pictorial sketches. 4-center ellipses are often sketched or drawn. Centers are located by construction lines.



Pictorial sketch of a counter bored hole.



ANSI Linetypes



WIDTH AND CHARACTER OF LINES

FIGURE 1

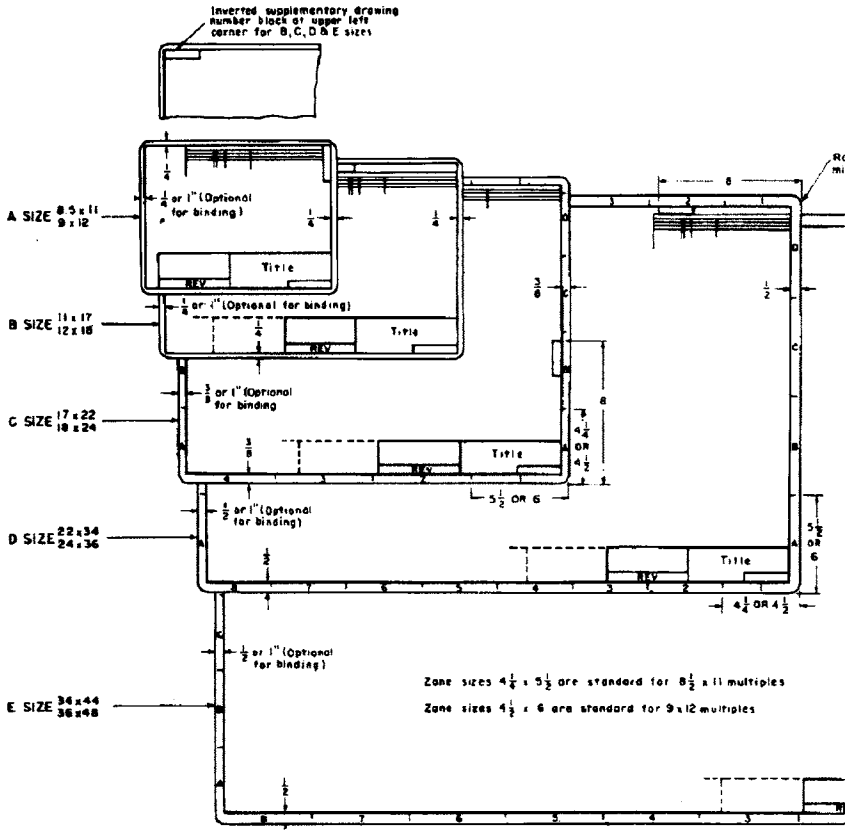
Extracted from American National Standards Institute Y14.2

Drawing Sizes - Copying Large Drawings

Drawings may require very large sheet sizes. Standard sizes are labeled:

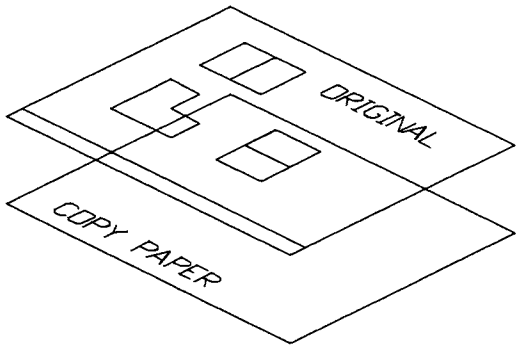
__A = 8 1/2 x 11
__B = 11 x 17
__C = 17 x 22 etc.

(Figure extracted from A.N.S.I Y14.1).



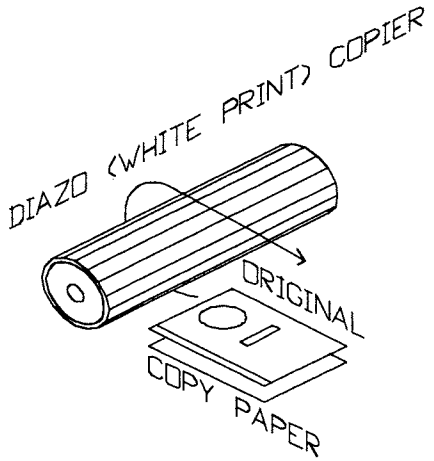
Drawings are created on transparent paper or plastic film. The reason the material is transparent relates to the copy process used to duplicate drawings. Many drawings are copied using the diazo process. This process allows large sheets to be duplicated at relatively low cost.

Prints are made by copying through the original. The copy paper is placed underneath. A bright light shines through from the top. Lines must be very black to prevent light from passing through.



In commercial machines a mercury-vapor light is placed inside a glass cylinder. The original and copy paper roll around the cylinder during exposure. Very long drawings may be duplicated this way.

Hot ammonia gas is used to develop the dry copy.



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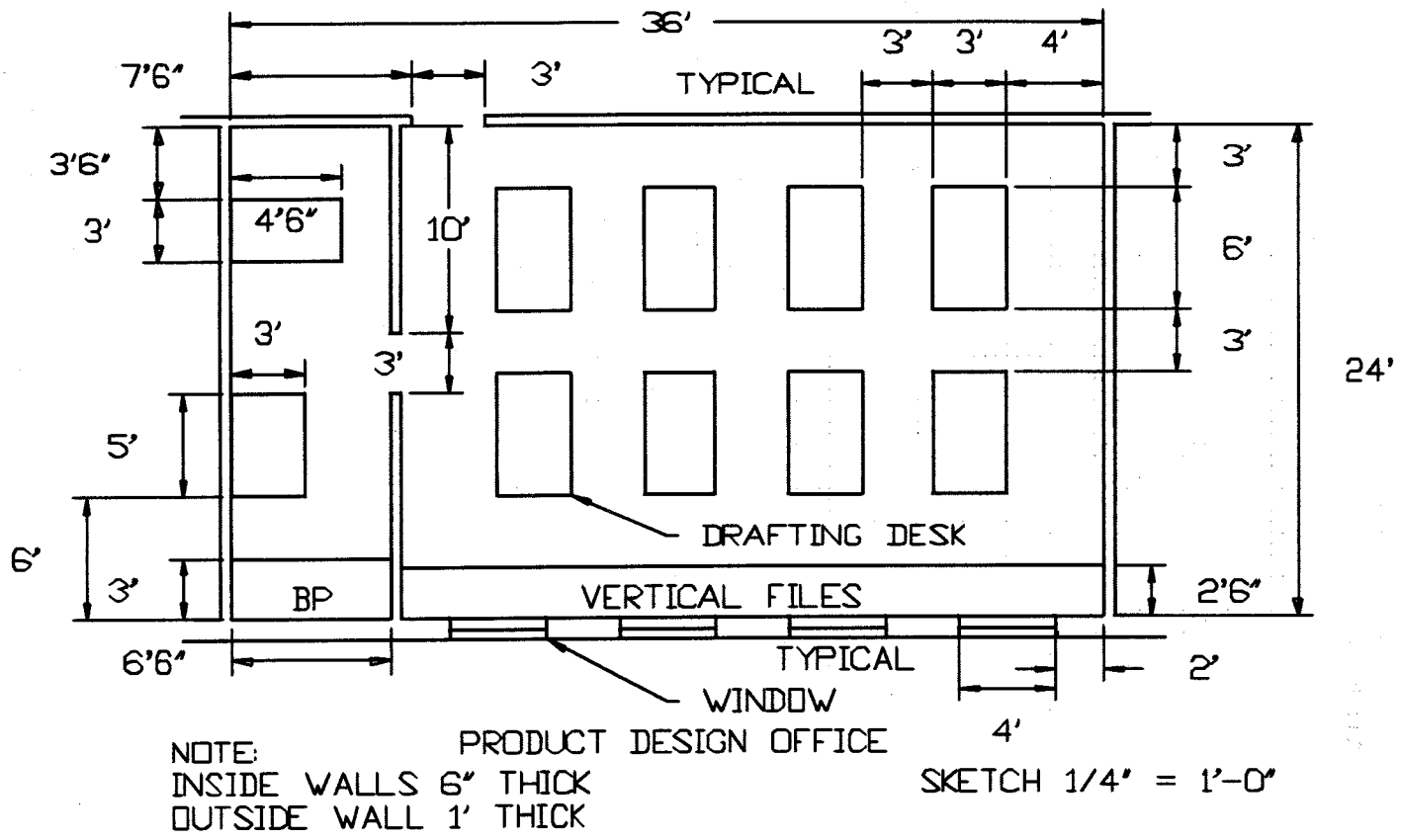

SK-7. Sketch the design office layout on rectangular grid. Use 1/4" = 1'-0" scale.
Use the grids printed on the back of other problems in this chapter.

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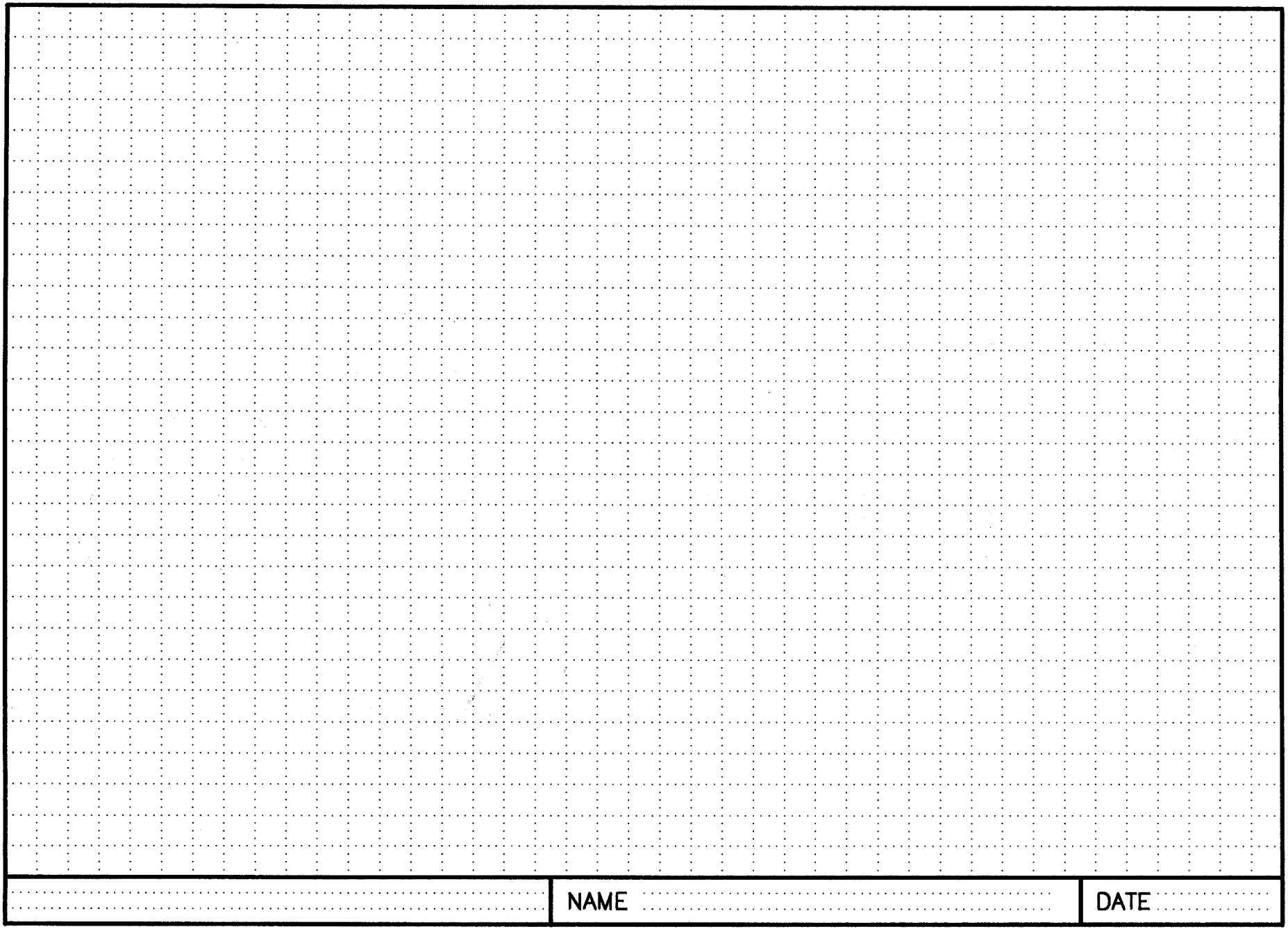

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