

## Fundamentals of Drafting - Freehand Sketching

### Objectives:

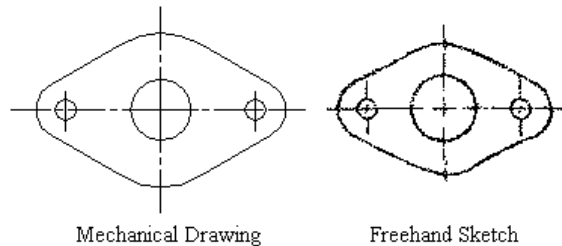


1. To distinguish between mechanical drawing and freehand sketch.
2. To recognise the importance of freehand sketching in engineering communication.
3. To illustrate the techniques in freehand sketching in terms of:
  - (a) density of line
  - (b) good form
  - (c) proportion
  - (d) scale
4. To freehand sketch components in orthographic, isometric and oblique projections.

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### Defining freehand sketching

A drawing which is prepared using drawing instruments showing the exact representation of an object is called a mechanical drawing. In contrast, *a freehand sketch is a drawing in which all proportions and lengths are judged by eyes and all lines are drawn without the use of drawing instruments.*



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### Use of freehand sketching

Freehand sketching benefits the entire process in engineering communication: from designers to draftsmen, from workshop supervisors to craftsmen. A sketch may be all that is needed to convey enough of the design that finished engineering drawing can be produced. Sketches may be *schematic* or *instructional* and produced to convey ideas between engineering personnel.

Comparing with mechanical drawing, the use of freehand sketching in engineering communication provides the following advantages:

- i) A better means of visualising problems
- ii) Organising ideas more quickly
- iii) Avoiding wasting of time on formal drawing methods

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### Sketching tools

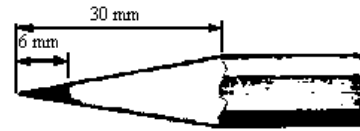
A sketch communicates information and does not have to be an exact drawing. Many designs were visualised on just a piece of paper or whatever is available. The tools that are used in freehand sketching are:

- |                    |  |
|--------------------|--|
| i) Sketching paper | cross-section paper or grid paper, help secure good proportions and serve as guides in sketching lines |
| ii) Pencil         | medium lead (F) or soft lead (HB) type   |
| iii) Eraser        | soft type  |

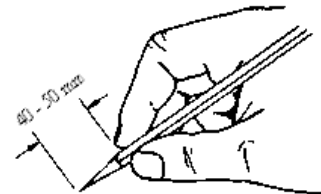
### Use of pencils

Although freehand lines will never be perfectly straight and absolutely uniform along their lengths, effort should be made to sketch distinct, black and uniform lines. Hints of using pencils that help sketching to be made to approach exacting uniformity are as follows:

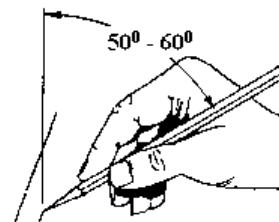
- i) Sharpen the pencil to obtain a proper point



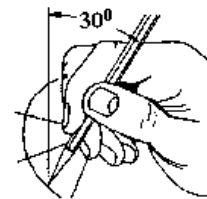
- ii) Hold the pencil loosely, approximately 40 - 50 mm from the point



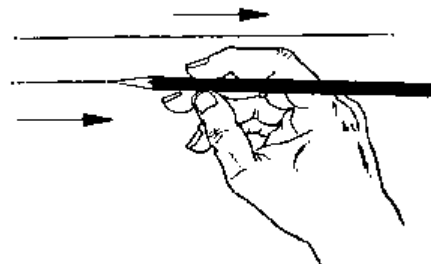
- iii) Slant the pencil at an angle of 50 - 60 degrees from the vertical for sketching straight lines



- iv) Slant the pencil at an angle of 30 degrees from the vertical for sketching circles



- v) Pull the pencil when sketching straight lines or curves

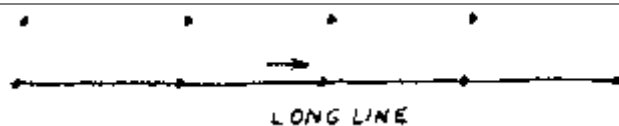


### Sketching techniques - Sketching horizontal lines

- i) Mark the end points with dots to indicate the position of the line. Sketch the line between the two points, moving the pencil from left to right.



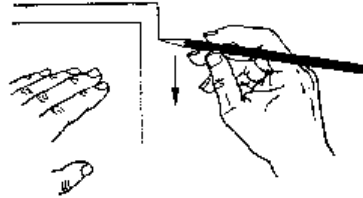
- ii) Use a series of dots for long lines for better alignment.



- iii) Short lines are sketched with a finger and wrist movement.
- iv) Long lines are sketched with a free arm movement.
- v) Make a few trial swings between the points before actually sketching the line.

**Sketching techniques - Sketching vertical / slant lines**

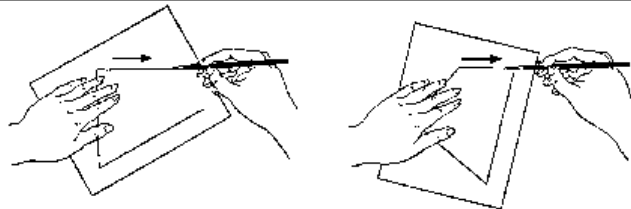
- i) Start sketching vertical line at the top end of the line and move the pencil downward.



- ii) Move the pencil from left to right when sketching slant lines.



- iii) Turn the paper so that all lines can be sketched in a horizontal position.



**Sketching techniques - Sketching squares and rectangles**

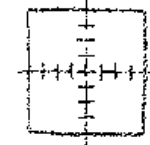
- i) Sketch horizontal and vertical centre lines.



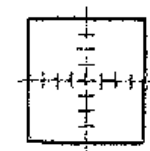
- ii) Space off equal distances on these centre lines.



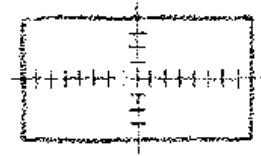
- iii) Sketch slight horizontal and vertical lines through the outermost points to form the square.



- iv) Darken the lines

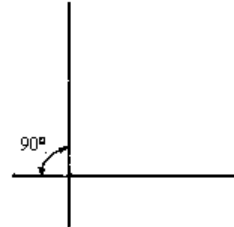


- v) Rectangles can be sketched in a similar way.

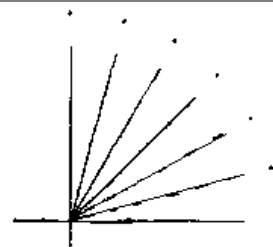


### Sketching techniques - Sketching angles

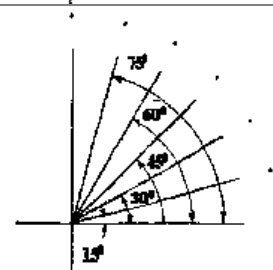
- i) Sketch a vertical line and a horizontal line forming a right angle.



- ii) Slightly sketch equally spaced lines which divide the right angle into several equal and smaller angles.

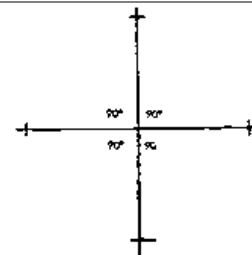


- iii) Project a dark line through the one point that represents the angle desired.

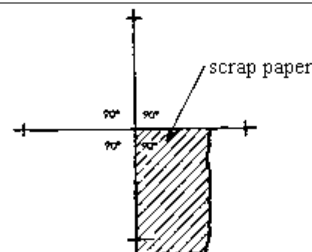


### Sketching techniques - Sketching circles and arcs

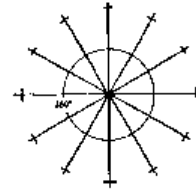
- i) Sketch a vertical line and a horizontal line through a point making the centre of the required circle.



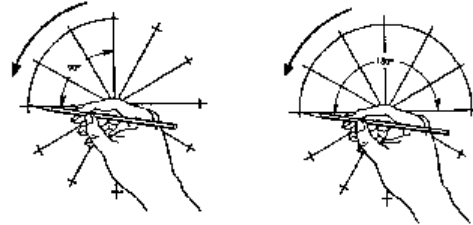
- ii) Mark off the desired radius on a piece of scrap paper and establish points along the centre lines.



- iii) Add radial lines and establish points.



- iv) Draw short arcs through one quadrant at a time.

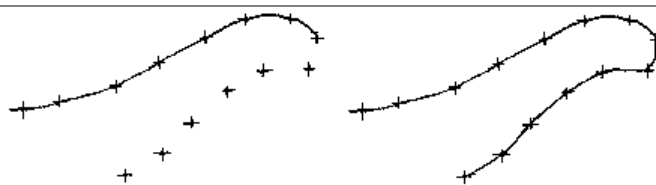


### Sketching irregular curves

- i) Locate a number of points to represent the shape of the required curvature.

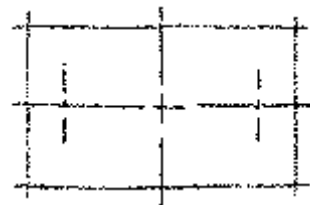


- ii) Sketch a series of arcs through these points to complete the curve.

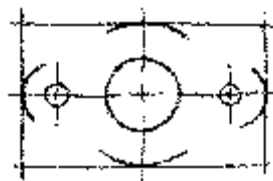


### Sketching one-view drawing

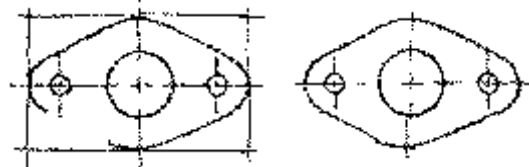
- i) Sketch a rectangle / box containing the drawing with light lines.



- ii) Always sketch circles and arcs first.



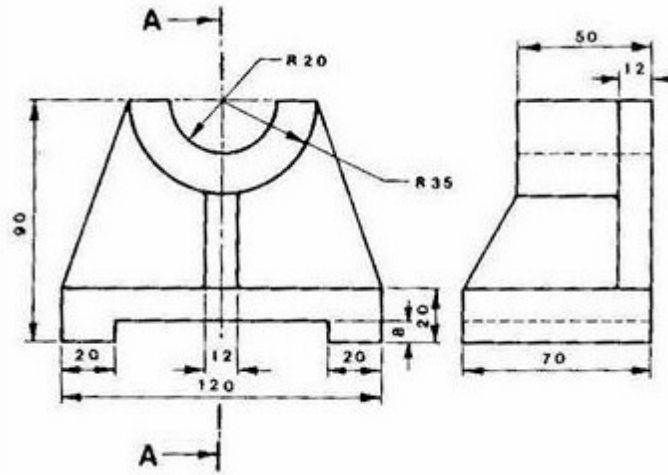
- iii) Sketch straight lines to complete the drawing.



### Assignment 6

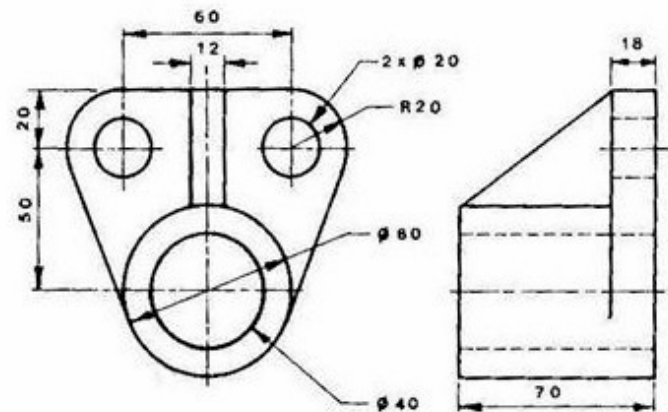
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**Question No. 1 (Referring to Figure 7.14)**  
 Freehand sketch in first angle projection a sectional front view on AA, a plan view and an end view of the component shown below (extracted from Figure 7.14 Part 1). Use appropriate scale for the sketch.



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**Question No. 2 (Referring to Figure 7.14)**  
 Freehand sketch an oblique view in cavalier projection the component shown below (extracted from Figure 7.14) Part 3). Select your own position of the component to show it to the best advantage with the minimum of distortion with the receding axis at 45 degrees.



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**Question No. 3 (Referring to Figure 7.14)**  
 Freehand sketch in isometric drawing the component shown below (extracted from Figure 7.14 Part 6). Select your own position of the component to give a good impression)

