

Chapter 1

Architectural Drafting



TOPICS

- Graphics language
- Engineering drawing
- Drawing standards
- Drawing Equipment's



GRAPHICS LANGUAGE

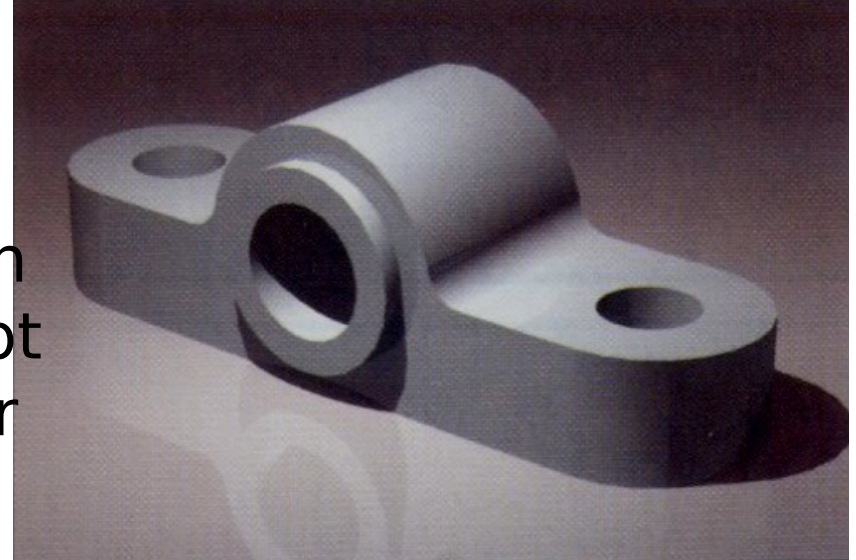
Q-1

Which language is more
effective to describe
drawing?

Graphic language
or
Word language
how?

Effectiveness of Graphics Language

1. Try to write a description of this object.
 2. Test your written description by having someone attempt to make a sketch from your description.
-



You can easily understand that ...

The word languages are inadequate for describing the **size**, **shape** and **features** completely as well as concisely(briefly).

Composition of Graphic Language

Graphic language in “**engineering application**” uses **lines** to represent the **surfaces**, **edges** and **contours** of objects.

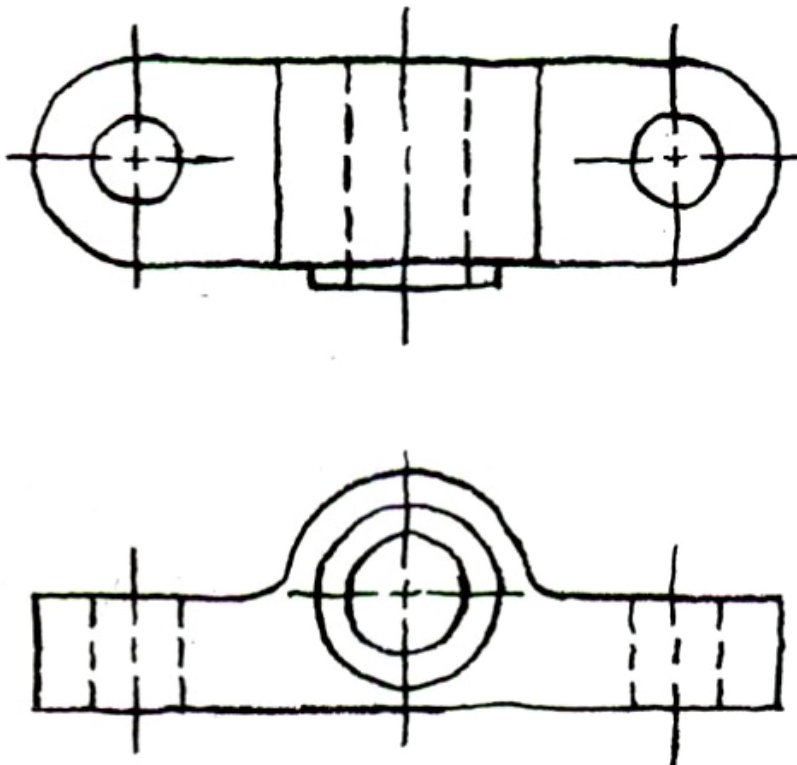
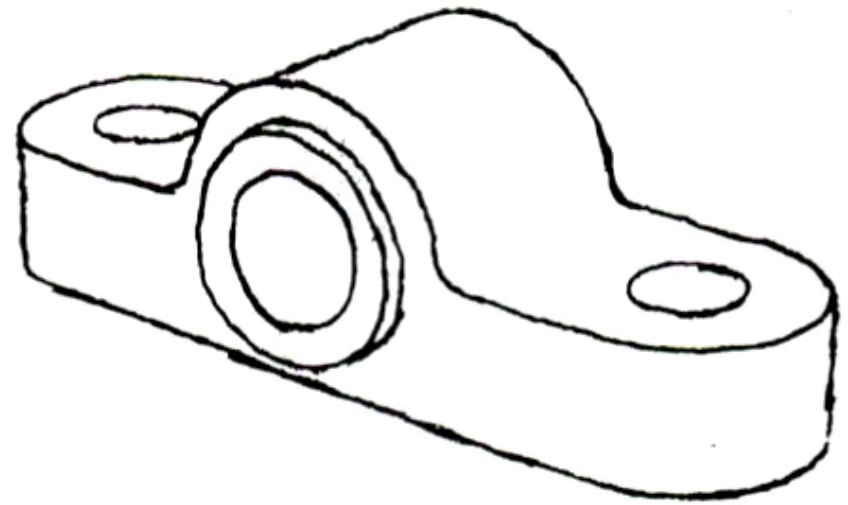
- The language is known as “**drawing**” or “**drafting**” .
- A drawing can be done using **freehand**, **instruments** or **computer** methods.

Freehand drawing

The lines are sketched without using instruments other

than pencils and erasers.

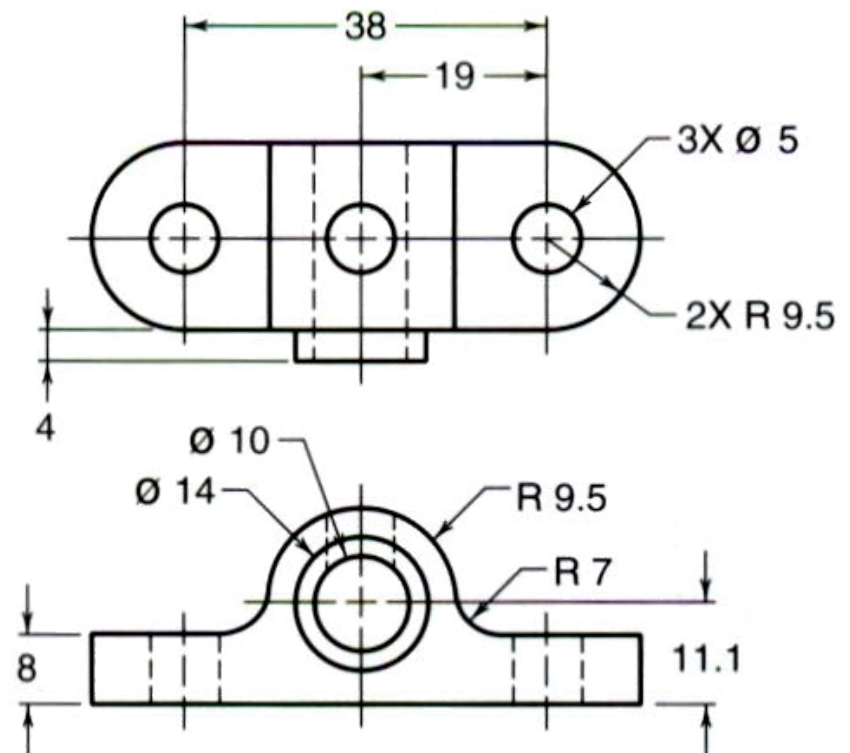
Example



Instrument drawing

Instruments are used to draw straight lines, circles, and curves concisely and accurately. Thus, the drawings are usually made to scale.

Example



Computer drawing

The drawings are usually made by commercial software such as AutoCAD, solid works etc.

Example



Engineering Drawing



- ❖ Engineering drawing is a two dimensional representation of three dimensional objects.
- ❖ In general, it provides necessary information about the shape, size, surface quality, material, manufacturing process, etc., of the object.
- ❖ It is the graphic language from which a trained person can visualize objects.

Elements of Engineering Drawing

Engineering drawing are made up of *graphics language* and *word language*.

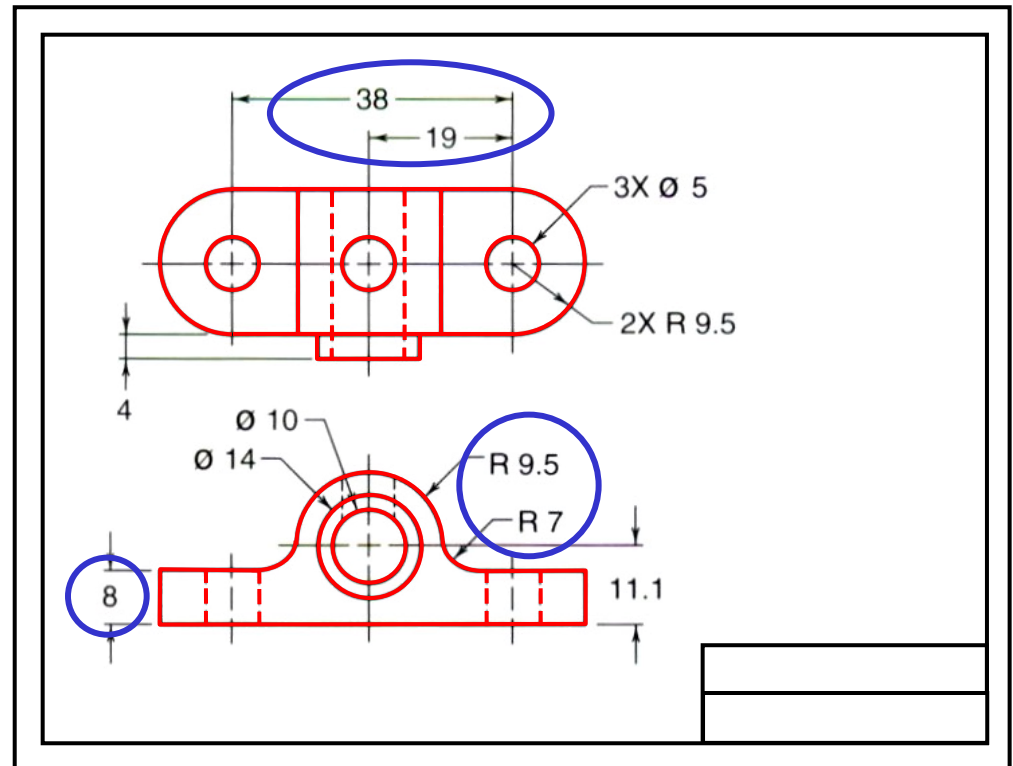
Graphics language

Describe a shape (mainly).

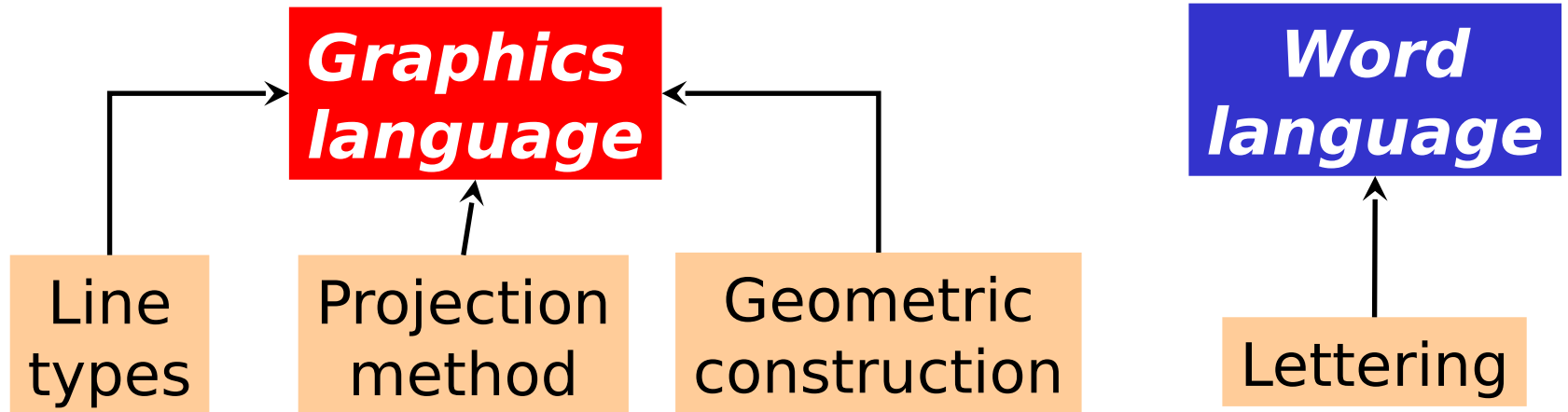
What the drawing looks like

Word language

Describe size, location and specification of the



Basic Knowledge for Drafting



Why we call engineering drawing is the universal (worldwide) language of engineers?

Drawings prepared in one country may be utilized in any other country irrespective of the language spoken.

Any drawing language to be communicative, should follow certain rules so that it conveys the same meaning to every one.

As compared to verbal or written description, this method is brief and more clear.

Drawing Standard

Standards are set of rules that govern how technical drawings are represented.

Drawing standards are used so that drawings **convey the same meaning to everyone** who reads them.

Partial List of Drawing Standards

Code number	Contents
JIS Z 8311	<i>Sizes and Format of Drawings</i>
JIS Z 8312	<i>Line Conventions</i>
JIS Z 8313	<i>Lettering</i>
JIS Z 8314	<i>Scales</i>
JIS Z 8315	Projection methods
JIS Z 8316	Presentation of Views and Sections
JIS Z 8317	Dimensioning

Drafting Convention

Q-2

What we mean by Drafting Convention?

Briefly describe

Drafting Equipment's

Technical drawings must be neat, clear, concise, and accurate. Drawing **Equipment's** are mainly used to produce such drawings

clear understanding of all drafting **Equipment's** and their uses is important to speed up the process of drawing preparation.

On the other hand basic knowledge on all drafting **Equipment's** and their uses is important to produce clear drawing and helps to know where, how and when to use them.

(proper use)

Drawing Materials

Basic drawing materials which are essential in preparing a technical drawing are:

- ☐ Drawing paper
- ☐ Drawing pencil
- ☐ Drafting or masking tape
- ☐ Eraser and erasing shield
- ☐ Rapidograph

Drawing Instruments

Main drawing instruments are

- | | |
|---------------------|-----------------|
| 1. Drawing board | 7. Protractor |
| 2. Dusting brush | 8. French curve |
| 3. Templates | 9. T-Square |
| 4. Pencil sharpener | 10. Divider |
| 5. Scale | 11. Compass |
| 6. Set square | |

Q-3

**Based on the previous
list**

**What are basic
difference between
drawing Materials and
instruments ?**

Drawing Materials and Instruments

drawing materials are basically needed and necessary to prepare a technical drawing while **drawing instruments** are important to speed up the process of drawing preparation.

Specially drawing instruments need a clear understanding on their proper uses because of that "a drawing is as good as its instruments and its proper uses".

Drawing materials & Their use

Drawing papers are the materials on which the drawings are made.

Depending on its application different types of drawing papers are available.

These are:

- ❖ white plain paper,
- ❖ plan/ profile paper, Cross section paper and
- ❖ tracing paper.

White plain papers:

are general purpose for office uses and drawings. They are manufactured according to ISO (International Organization for Standardization) standard paper sizes. Standard drawing sheet sizes are in three series, designated A_n , B_n , and C_n . (where n is number)

Profile, Plane/ Profile and Cross section papers:

are referred to as gridded papers. The first two are used for **road design** and the later one is used for **drawing road cross sections, rough design, sketching, preparing schedules, plotting graphs, etc.**

Tracing paper:

is a high-grade white transparent paper, upon which **copies** or "**tracings**" are made for the purpose of reproducing

- Tracing may be made in ink, usually it takes ink well, and from which pencil lines can easily be erased. Reproductions (printing) can be made directly from pencil drawings on tracing paper however, for better results in production, a pencil drawing on tracing paper is usually inked over.

Q-4

Tracing paper must not be folded. WHY?

Q-5

List Paper and frame sizes for A,B,C-series including their application area(use)

Drawing Pencil

Drawing pencil is the most important drawing material. The accuracy and appearance of a Drawing depends on the quality of Pencil used to make Drawing.

- Basically there are two types of pencils used in drawing.
- These are **mechanical** (**FIXER**) and **wooden pencils**

- Drawing pencils have different grades of hardness. The grade of a pencil is designated by a number and a letter.
- The grades are like **9B (very soft), 8B, 7B, 6B, 5B, 4B, 3B, 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H, 7H, 8H, to 9H (very hard)**. Generally speaking, the **soft (B)** grades are used for **freehand sketching** and the hard **(H)** grades are used for **instrumental drawings**.
- Similarly, mechanical pencils have a wide variety of lead grades. Like as **0.3, 0.5, 0.7,** and 0.9 diameters. Here, no sharpening of leads is necessary.

Q-6

Darker														Lighter					
9B	8B	7B	6B	5B	4B	3B	2B	B	HB	F	H	2H	3H	4H	5H	6H	7H	8H	9H
Softest														Hardest					

a. Drawing pencils have different grades of hardness, as shown above pencil with softest grade is more darker and as grade of pencil goes harder it becomes lighter.

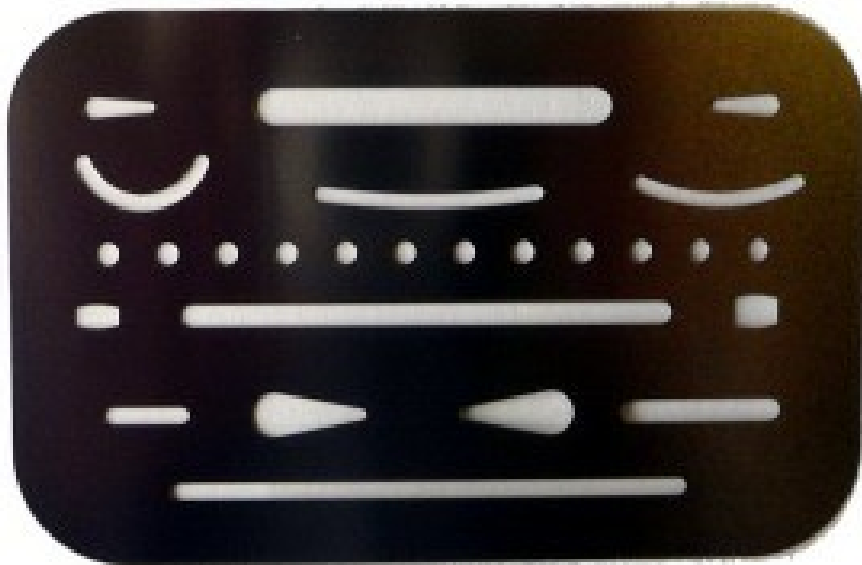
Why?

b. While we sharpen our wooden pencil we have three levels, (to sharp, medium and dull). Which one is acceptable(recommended)?

Why?

Eraser and Erasing Shield

Erasers are used to clean unnecessary drawing works in the process of making a drawing. This is if corrections and changes may be required. An erasing shield restricts the erasing area so that the correctly drawn lines will not be disturbed during the erasing procedure. The shield is used by placing it over the line to be erased and erasing through the cutout.



Masking Tape

Masking tapes are used to fix the Drawing sheet on the Drawing board. Before starting drawing, it is a common practice to attach the drawing paper to the drawing board in order to avoid unnecessary errors due to misalignment.

Rapidograph

Rapidograph is a type of drawing ink pen which is used to draw on tracing papers. It produces light resistant, waterproof, precise and consistent ink lines for any application. Since most rapidograph pens require different pen sizes (line widths) for various projects, they are manufactured in different sizes.



Drawing Instruments & Their use

Drawing Board

Drawing boards are usually made of white Pine and other soft woods. Basically, the working surface (the drawing surface) should be flat, smooth and firm. The working edge of a drawing board must be straight and should be tested with a steel straight edge.

Drawing boards are made in various sizes. Those usually used in school measure 23 x 30 cm, 40 x 53 cm or 46 x 60 cm. The smallest size is mostly used for



Depending on their design, drawing tables may be fixed in height or can be adjusted to any desired working height. Portable drawing boards are very handy for professionals as well as students.

The tracing table is another accessory that facilitates the draftsman work. **A tracing table allows us to trace work too blurred or dirty on a new paper. It provides the advantage of rectifying another error, such as stains or mistaken lines of ink, or other mistakes non-correctable** in some other surfaces. Sometimes it simply helps us to improve the presentation of the drawings.

Dusting Brush

Is used to remove or clean particles coming from the eraser which will remain on the drawing paper during erasing. It is poor practice to use fingers or palm of the hand for cleaning the drawing paper.

Drawing Templates

A template is a thin and flat piece of plastic containing various cutout shapes. It is designed to increase the speed and accuracy of the drafter. A template should be used whenever possible to increase the accuracy and the speed.

The most commonly used type of drawing templates are

a) *Geometric shapes drafting template*

b) *Architectural drafting template(furnishing template)*

c) *Electrical drafting template*

Pencil Sharpeners

Pencil sharpeners are drawing instruments used for sharpening pencils and they may be operated manually or by an electric motor and therefore a mechanical pencil sharpener is hand-powered.



Protractor

For measuring or setting off angles other than those obtainable with the triangles, the protractor is used.

Scale

A scale is an item of drawing instrument that has been carefully graduated (marked) and calibrated (labeled) in convenient increments for the user. Scales enable a user to make size reductions or enlargements rapidly and accurately. Scales are graduated in such a way that they can be used to draw objects to scale by direct measurement without any calculation.

When one unit on the object equals one unit on the drawing, we say the object is drawn to full size scale; written as 1:1. When one unit on the object is equal to two units on the drawing, we say the object is drawn to a magnification scale of 2:1. Whereas when two units on the object is equal to one unit on the drawing, we say the object is drawn to a reduction scale of 1:2. Similarly, a scale of 1:10 means one unit on the drawing is equivalent to ten units on the object and so on.

Designation of Scale

Designation of a scale consists of the word "scale" followed by the indication of its ratio.

Designation Description

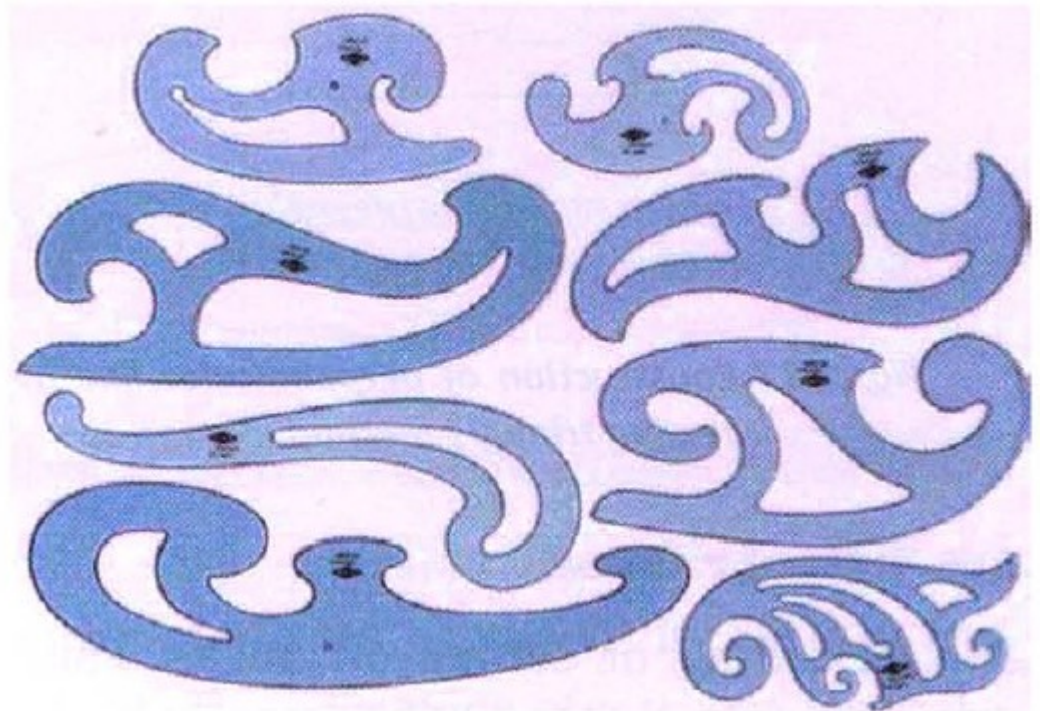
SCALE 1:1 Full scales

SCALE X:1 Enlargement scales

SCALE 1:X Reduction scales

French Curve

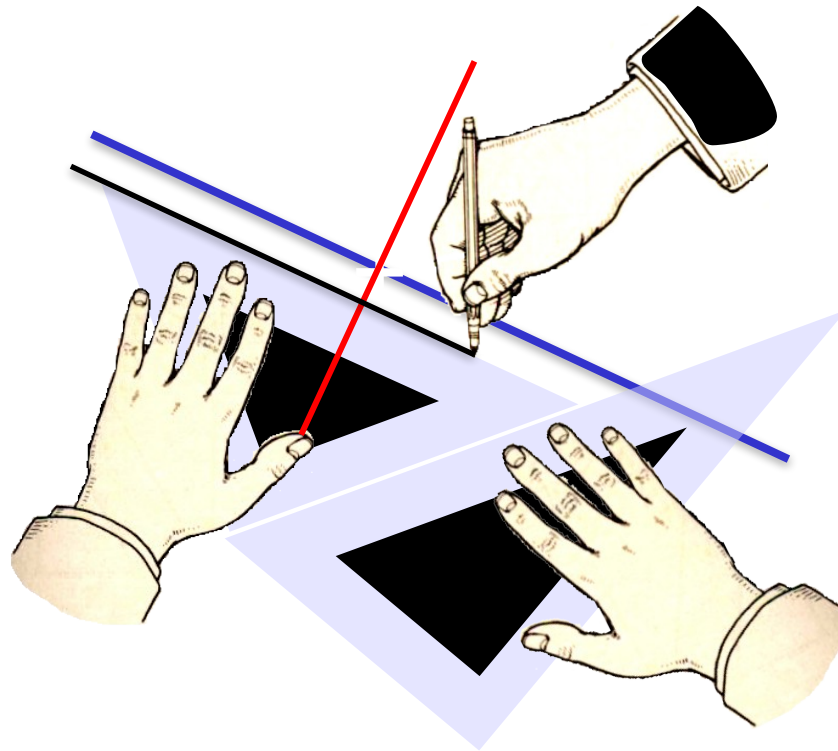
When it is required to draw mechanical curves other than circles or circular arcs, a French curve is generally employed.



Triangles (Set-squares)

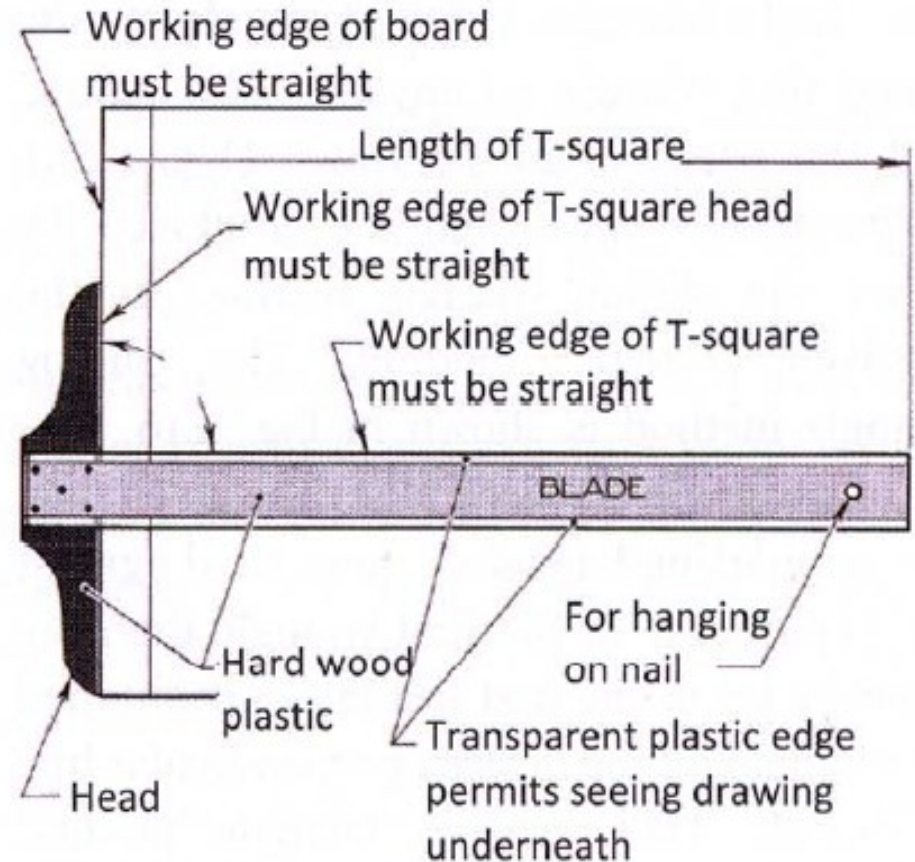
Triangles are sometimes called setsquares. The capability of rapidly producing straight lines on instrument drawings is provided by the 30-60° and 45° triangles. These instruments are useful for drawing such inclined lines as the slope of a stair or the pitch of a roof. Using the triangles as a pair, you can generate parallel and perpendicular lines and produce angles of a multiple of 15°.

Parallel lines are produced by establishing one side of a triangle along the given line or line direction. The supporting triangle is then fixed against one of the other sides of the first triangle.

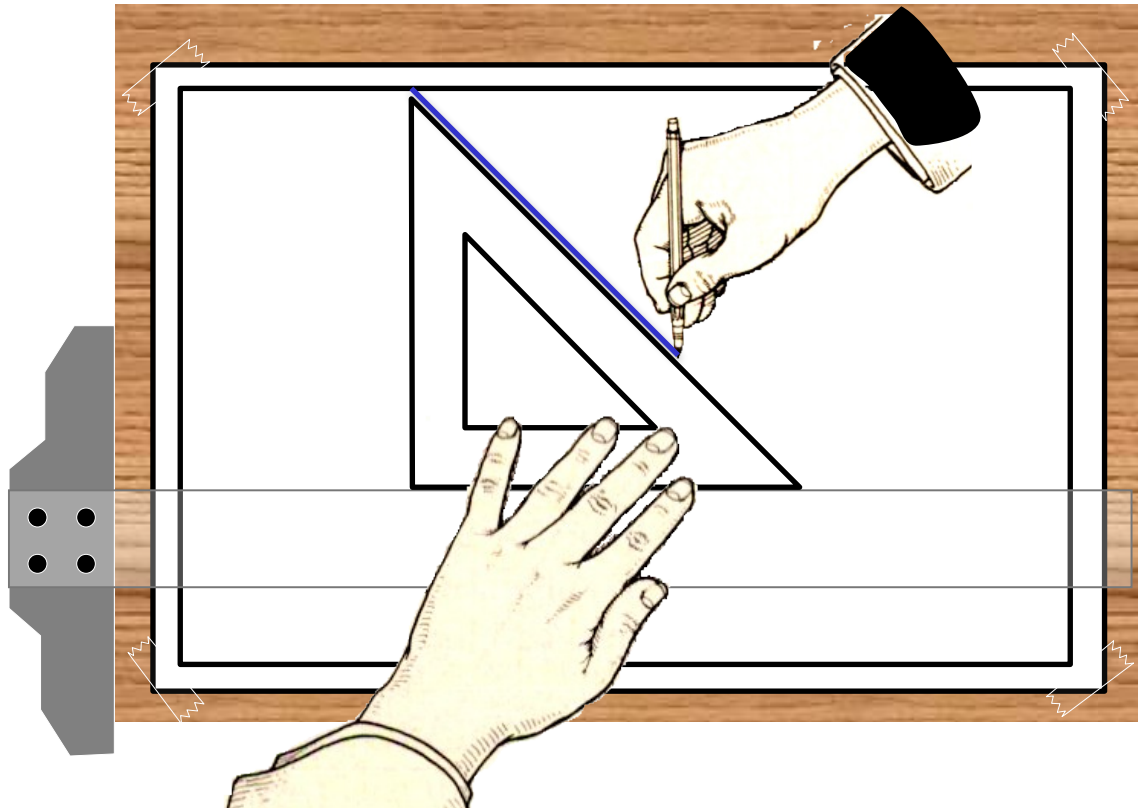


T-square

T square is a very important drawing instrument. The upper edge of a T - square and the inner edge of its head are called the working edges of the T-square. The working edges of a good T - square should be straight and right angle with each other.

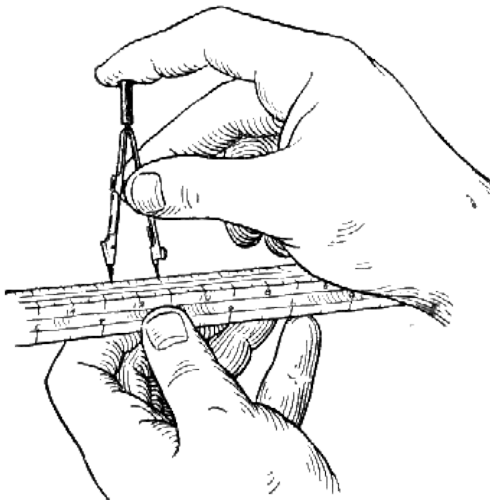
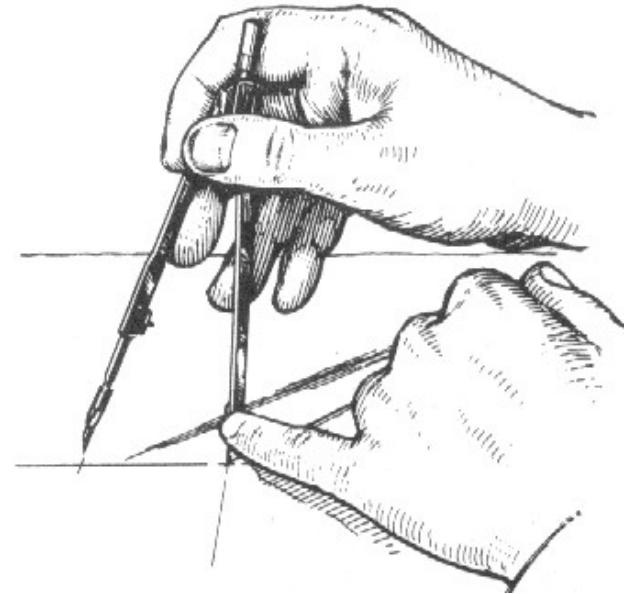


Basically, T-square is used to draw horizontal lines and to support or guide the set squares. However, T-squares with inclined working edge and with adjustable head are also used to draw inclined lines.



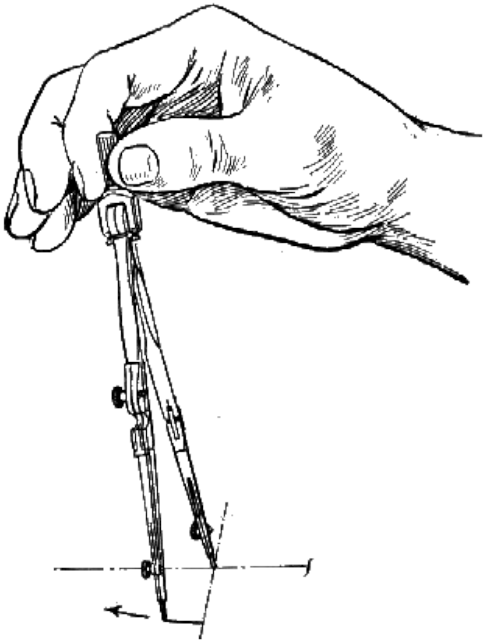
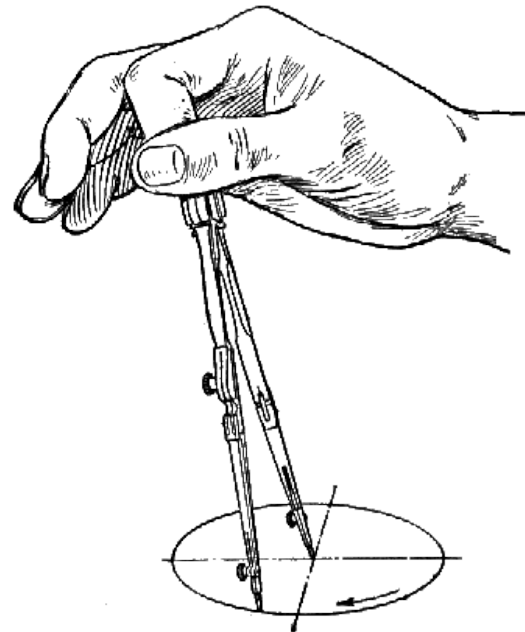
Divider

A divider is a drawing instrument used for dividing distances into equal parts or for laying off a series of equal spaces. Specified measurements can be obtained from scales or another drawing and transferred to the drawing being prepared.



Compass

Compasses are used to draw circles and arcs. Depending on **their application** we can divide them into two, **bow compass** and **beam compass**. *The beam compass type is used for drawing circles and circular arcs larger than those made by the bow compass and for transferring diameters those are too great for the regular dividers.*



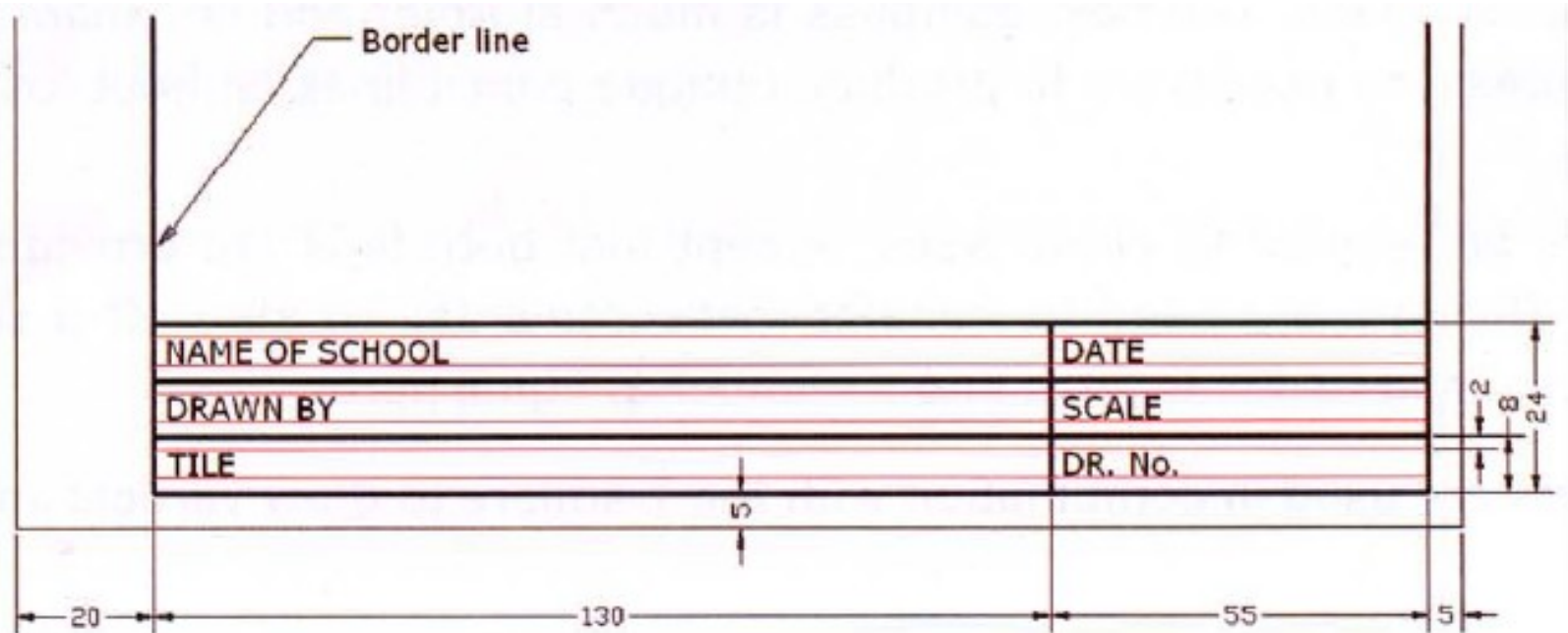
TITLE BLOCK

THE TITLE BLOCK SHOULD LIE WITHIN THE DRAWING SPACE AT THE BOTTOM OR BOTTOM RIGHT HAND CORNER OF THE SHEET.

THE TITLE BLOCK CAN HAVE A MAXIMUM LENGTH OF 170 MM FOR LANDSCAPE USE OF A4 PAPER AND FOR PAPER LARGER THAN A4 BUT FOR PORTRAIT A4 USE LENGTH TO FIT WITH PAPER PROVIDING THE FOLLOWING INFORMATION.

1. TITLE OF THE DRAWING.
2. DRAWING NUMBER.
3. SCALE.
4. SYMBOL DENOTING THE METHOD OF PROJECTION.
5. NAME OF THE FIRM, AND
6. INITIALS OF STAFF WHO HAVE DESIGNED, CHECKED AND APPROVED.

The primary purpose of a drawing **title block** is **to identify a drawing**. An example of a typical title block and one suggested for students class work are shown on the following pic.



Those are the samples of title block, but we can develop our title blocks which basically fulfill main requireme

170					
	NAME	DATE	MATERIAL	TOLERANCE	FINISH
DRN					
CHD					
APPD					
PROJECTION		LEGAL OWNER	TITLE		
SCALE			IDENTIFICATION NUMBER		
65					

Fig. 2.2(a)

150			
NAME OF STUDENT		TITLE	
CLASS :		DRGNO:	SCALE
ROLL NO :		GRADE :	
DATE :		VALUED BY	
50		50	50
<div style="display: flex; justify-content: space-between;"> 20 10 10 10 </div>			

Home work

- 1. All Question listed in Power point***
- 2. list the steps drawing starting from Preparation of Tools***