DRAWING STANDARDS AND GEOMETRICAL CONSTRUCTION

1.1 INTRODUCTION

All engineered products or objects manufactured, begin as ideas and ideas must be communicated to manufacturer, learner and reader effectively. Engineering drawing is a technical drawing language, which is systematically and scientifically developed and effectively used to fully and clearly define ideas of engineered products.
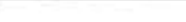
1.2 ESSENTIAL DRAWING INSTRUMENTS FOR STUDENTS

Drawing instruments are used to prepare drawings easily and accurately. Good quality of instruments gives better accuracy in drawing.

1. Drawing Board [B2/B3 Size]
2. Mini Drafter
3. Set Square with Protractor [45°]
4. Eraser
5. Drawing Board Clips
6. Compass
7. Roll-N-Draw
8. French Curve
9. Drawing Pencils ['2H Grade' For construction lines and 'HB Grade' to Darken Lines]
10. A3 Size Drawing Book or A2 size Drawing sheets

1.3 TYPES OF LINES AND THEIR APPLICATIONS

Table 1.1: Types of Lines and their Applications

Sr. No.	Types of Line	Illustration	General Applications
1.	Continuous thick	————	Visible outlines, visible edges.
2	Continuous thin	————	Dimension line, extension line, leader line, hatching line, outline of adjacent part, revolved section.
3	Medium thick short dashes	-------------	Hidden line (non-visible line).
4	Long chain thin	—— - —— - ——	Centerline, locus line, pitch circle.
5	Long chain thin and thick at both the ends only	——— - —— - ———	Cutting plane line.
6	Continues thin way	∿∿∿	Irregular boundary lines, short break line.
7	Ruled line and short zig-zag thin	—✦—✦—✦—	Long break line.

1.4 DIMENSIONING

1.4.1 System of Dimensioning

1. **Aligned System:** Figures are placed above the dimension line.

2. **Unidirectional System:** Figures inserted centrally between the dimension lines

Methods of Dimensioning :

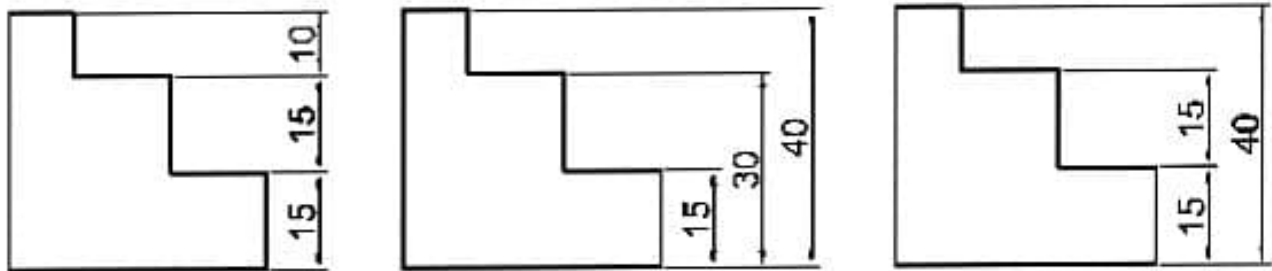|		
Chain dimensioning	:	The dimensions are arranged in a straight line.
Parallel Dimensioning	:	Common base line is used for all the dimensions. Smaller dimensions are nearer and larger dimensions are away from the view.
Combined dimensioning	:	The simultaneous use of chains and Parallel dimensions.

Fig. 1.1

1.5 LETTERING

These are one of the simplest letterings in which generally the ratio of height to width for most of the capital letters are taken as 6:6 or 6:5 and for most of the lower case letters are taken as 4:4.
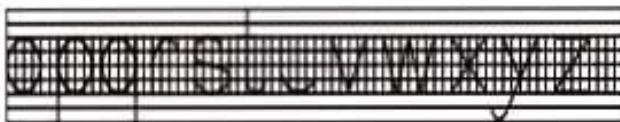
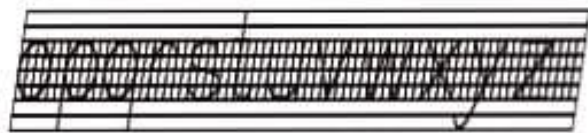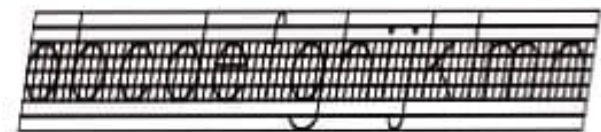

Fig. 1.2 : Vertical Single Stroke Letter

Fig. 1.3 : Inclined Single Stroke Letters at 750

1.6 SCALES

Full size scale　　　: Drawing made with actual measurements. i.e. 1:1

Reduced scale　　　: Drawing made to less than the actual size. E.g. 1:2, 1:5, 1:10

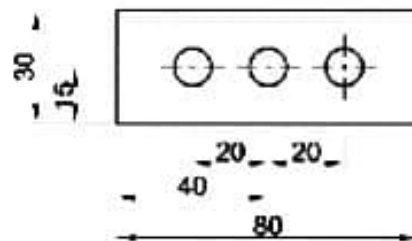Enlarged scale　　　: Drawing made to bigger than the actual size E.g. 2:1, 5:1, 10:1

Fig. 1.4

1. Line AB is given and is to be divided into 9 equal parts.

2. Draw a line from Point B at any convenient angle. With a scale or dividers, lay off nine equal divisions. The length of these divisions is chosen arbitrarily, but all should be equal.

3. Draw a line between the last division, Point A and Point 9.

4. With lines parallel to Line A-9, project the divisions to Line BC. This will divide line AB into nine equal parts.
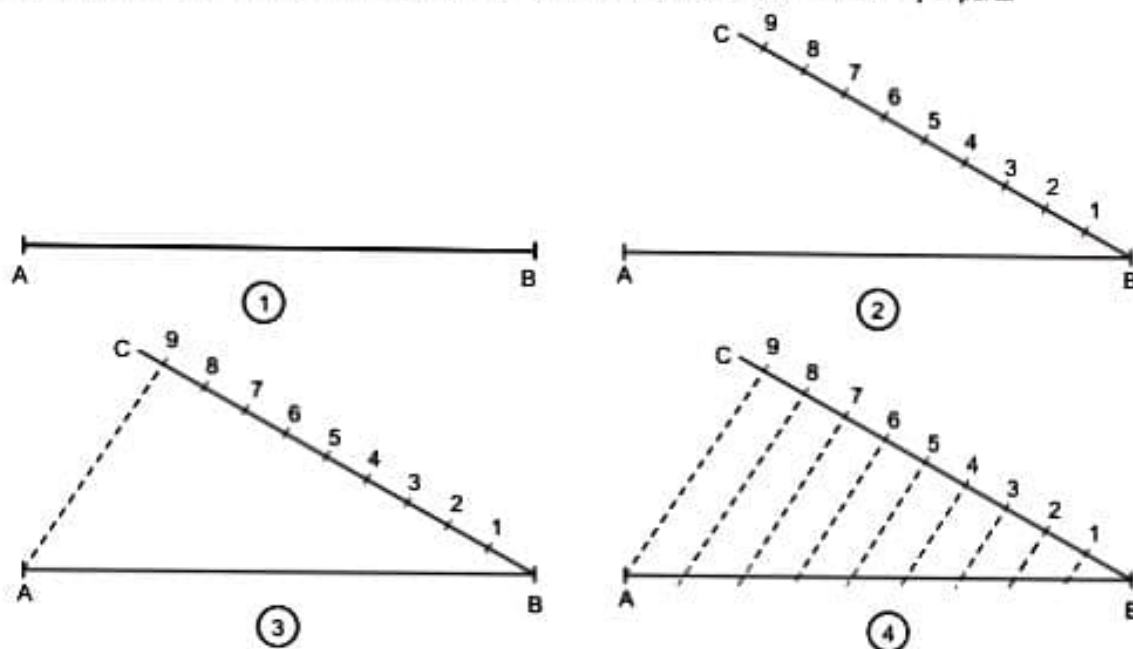
Fig. 1.5

1.8 BISECT AN ANGLE

1. Angle BAC is given and is to be bisected.

2. Strike Arc AD at any convenient radius.

3. Strike arcs with equal radii. The radii should be slightly greater than one-half the distance from Point B to Point C. The intersection of these two arcs is Point E, Figure C.

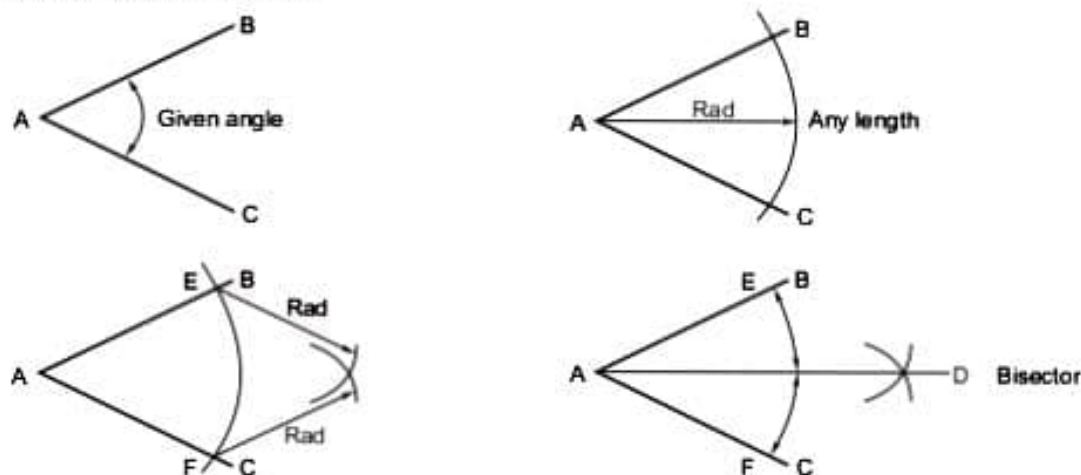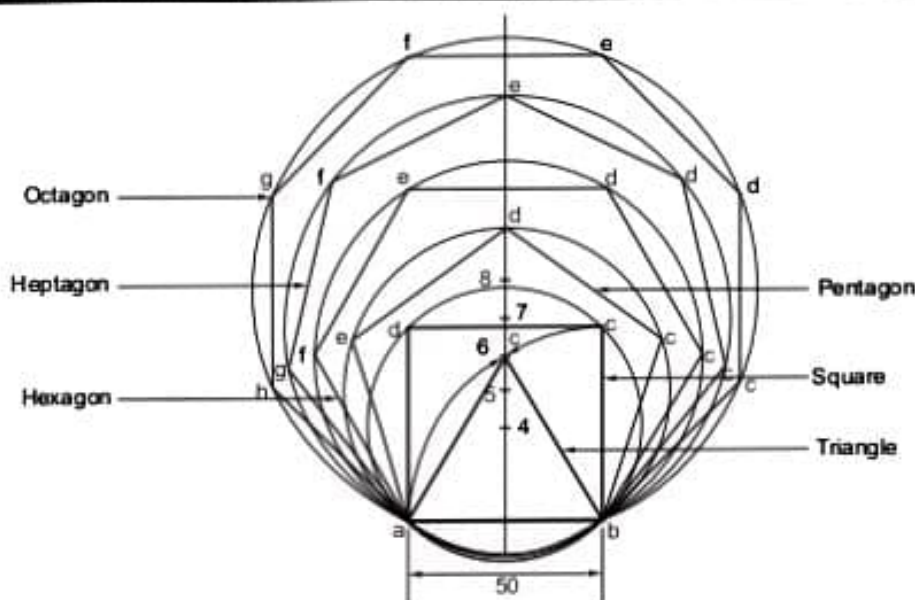4. Draw Line AE. This line bisects Angle BAC.

Fig. 1.6

1.9 DRAW POLYGONS BY THE UNIVERSAL METHOD OF POLYGON

Fig. 1.7

Step 1   First draw a line AB of the dimension equal to the side of a polygon i.e., 50mm.

Step 2   Then draw a perpendicular bisector of the line AB and draw it of sufficient length.

Step 3   Draw a perpendicular line BC from B of the length equal to the line AB.

Step 4   Connect the two points A & C by a straight line. i.e., AC

Step 5   Draw an arc by the center B and radius equal to AB between the points A & C.

Step 6   Mark the point 4 at the intersection of line 'AC with the perpendicular bisector.

Step 7   Mark the point 6 at the intersection of the arc AC with the perpendicular bisector.

Step 8   Find out the midpoint of between the points 4 & 6 mark it as a point 5.

Step 9   Mark points 7 & 8 at the distance equal to 4-5 or 5-6 in sequence.

Step 10   Draw a triangle ABC by connecting the line AC & BC at point 6.

Step 11   Draw circles by taking the points 4,5,6,7,8 as center points and divide the respective circles with the compass measurement equal to the distance of the line AB. i.e., 50mm.

Step 12   Connect the divided points of respective circles in sequence with straight lines to get respective polygons. Like Square, Pentagon, Hexagon, Heptagon and Octagon.

Step 13   Give the dimensions by any one method of dimensions and give the name of the components by leader lines wherever necessary.
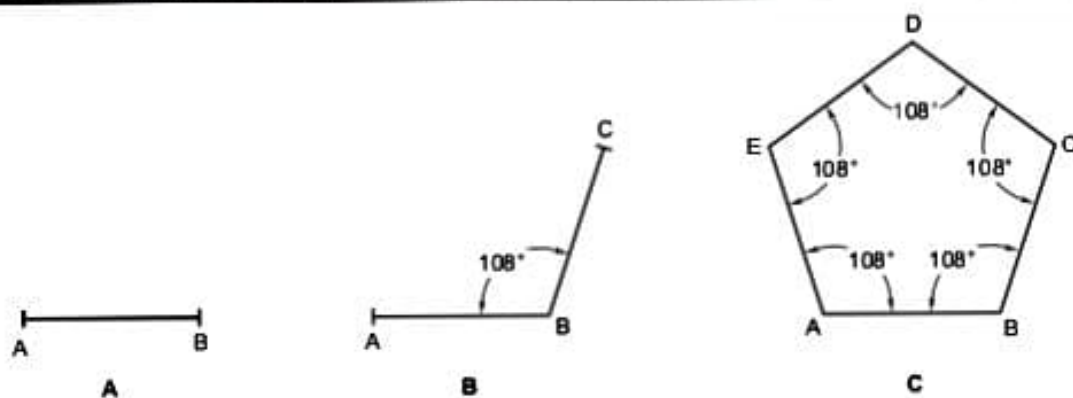
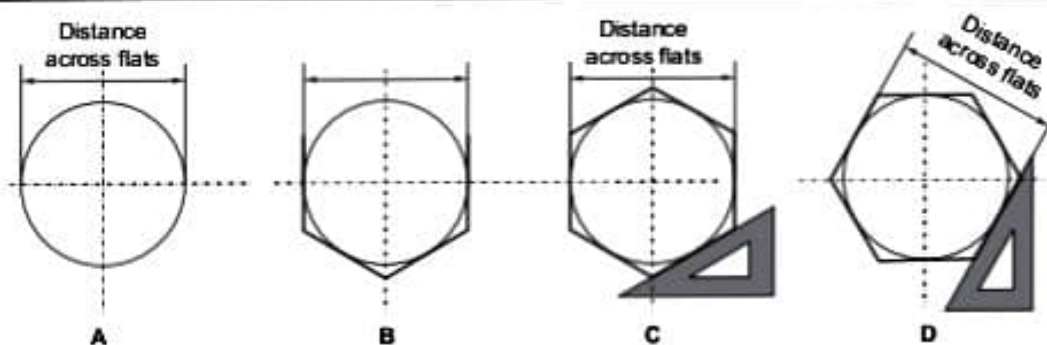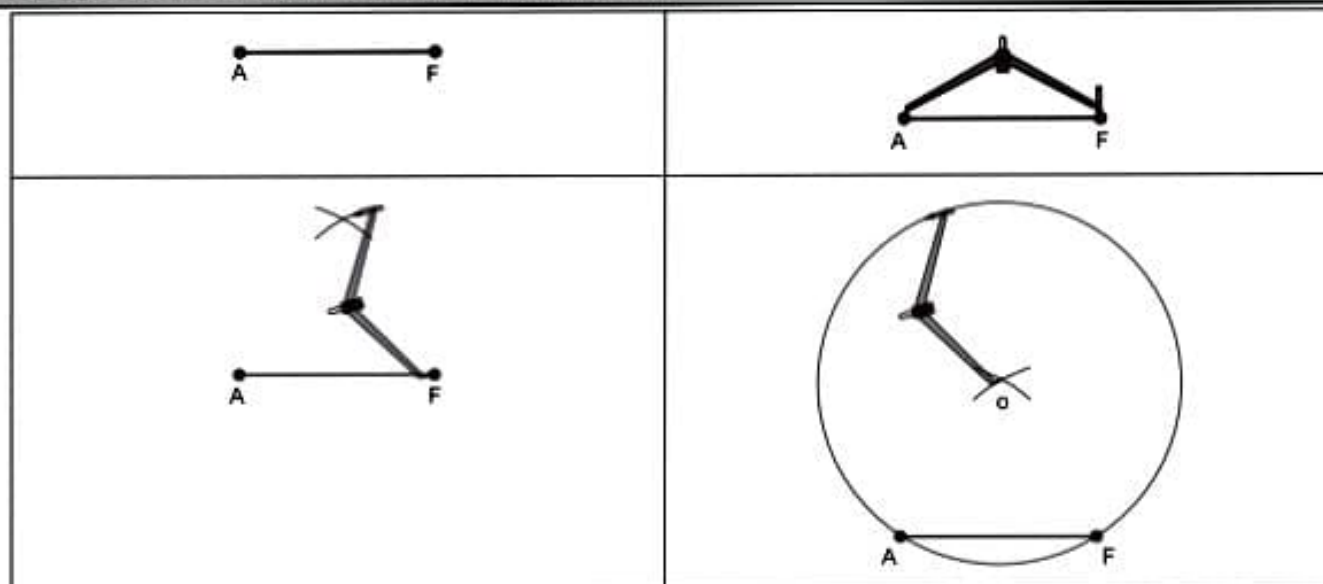## 1.10 CONSTRUCT A REGULAR PENTAGON WITH THE SIDE LENGTH

Fig. 1.8

1.11 CONSTRUCT A HEXAGON WITH THE DISTANCE ACROSS THE FLATS GIVEN

Fig. 1.9

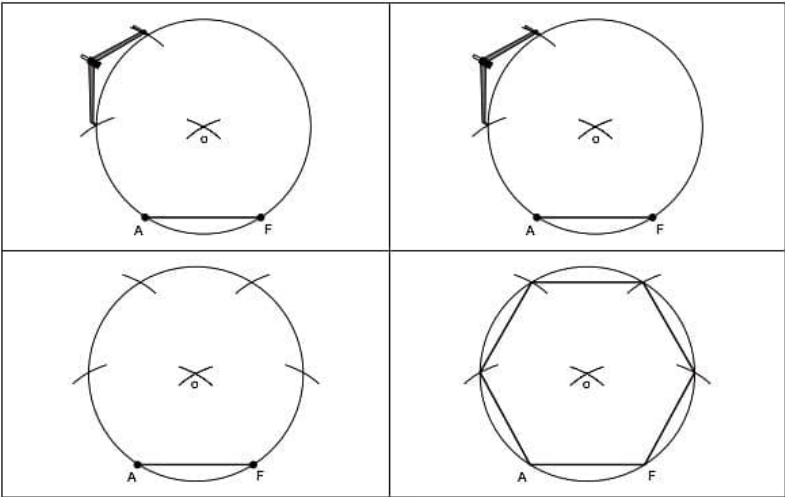## 1.12 CONSTRUCTING A HEXAGON GIVEN ONE SIDE

...Contl.

Fig. 1.10

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