INTRODUCTION TO CAD TOOLS

ENGINEERING GRAPHICS

DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY (INDIAN
SCHOOL OF MINES) DHANBAD
DHANBAD-826004

About the Software

- *The word **AutoCAD** is made of two words "**Auto**"(name of the company and **CAD** (computer aided design)*

- ***AutoCAD** is a CAD (Computer Aided Design or Computer Aided Drafting) software application*

- *It is widely used for 2D and 3D design and drafting.*

- *Developed by Autodesk company in 1982. It came to India in 1988.*

Why CAD (Computer Aided Design) ???
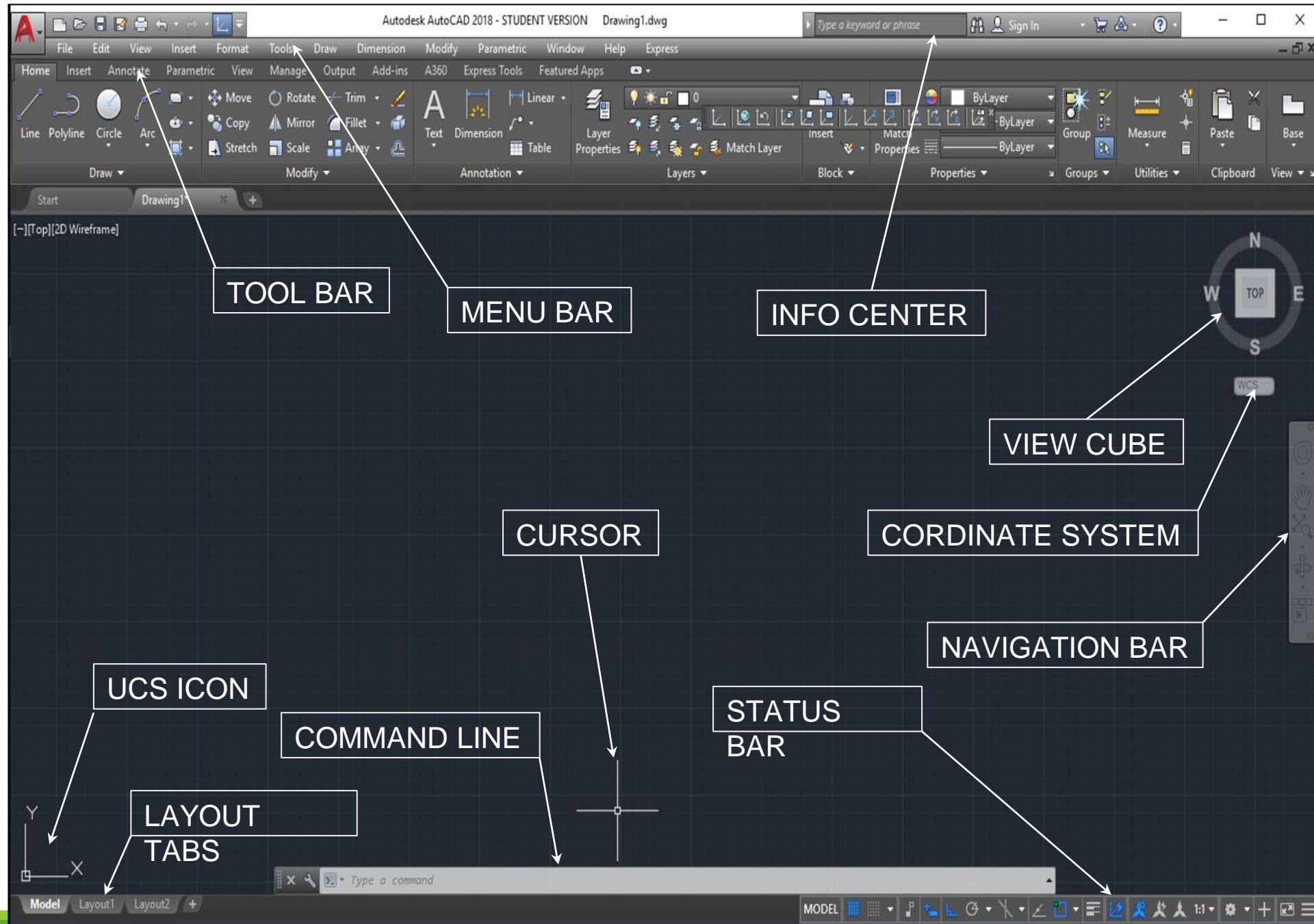
Improved productivity in drafting

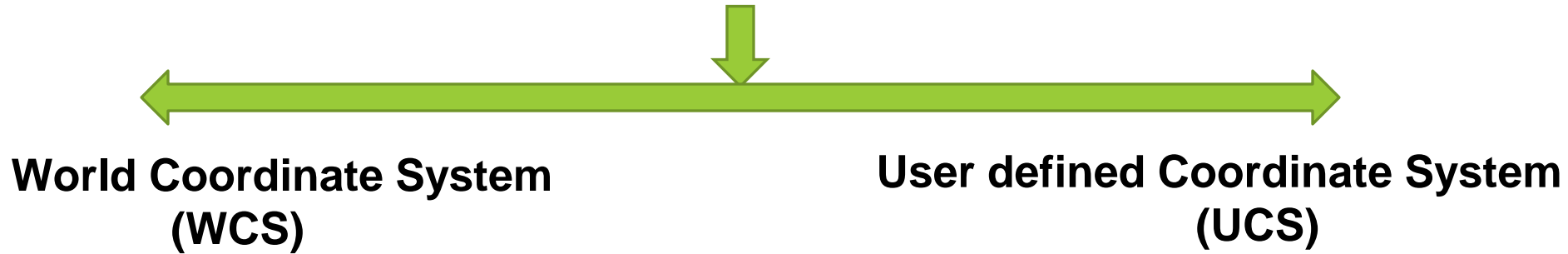*Improved quality over hand drafting*

Reduced manpower requirements

Modifications in Drawings are easier
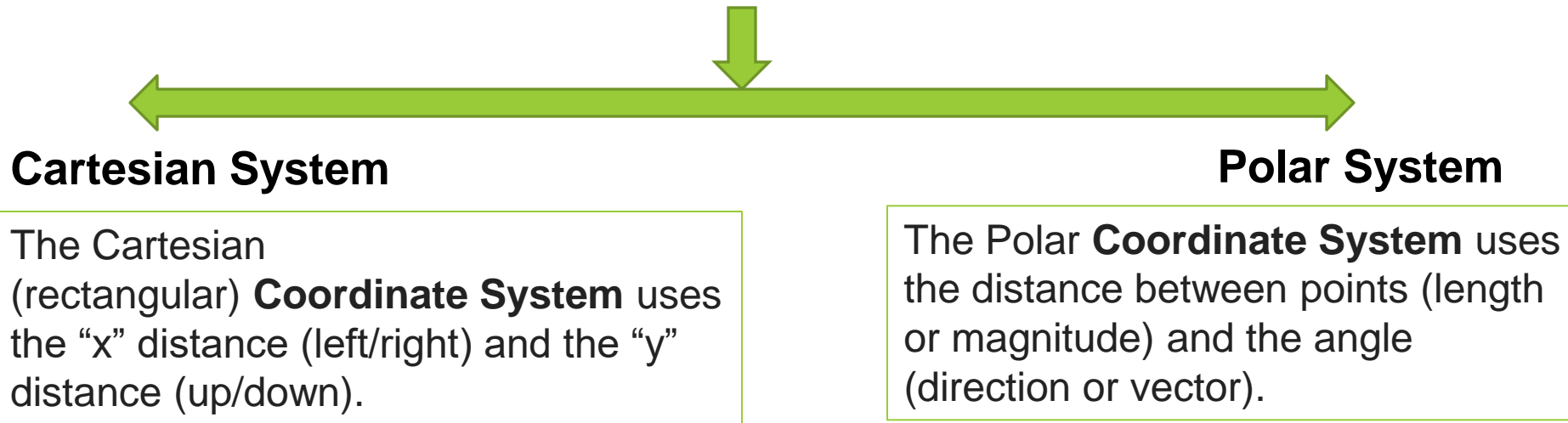
Improved Accuracy of Drawing

Easy to transfer

AutoCAD 2018 interface labeled with: TOOL BAR, MENU BAR, INFO CENTER, VIEW CUBE, CURSOR, CORDINATE SYSTEM, NAVIGATION BAR, UCS ICON, COMMAND LINE, STATUS BAR, LAYOUT TABS

Coordinate system in AutoCAD (Contd….)

World Coordinate System (WCS)

User defined Coordinate System (UCS)

Coordinate system in AutoCAD

Cartesian System

The Cartesian (rectangular) **Coordinate System** uses the "x" distance (left/right) and the "y" distance (up/down).

Polar System

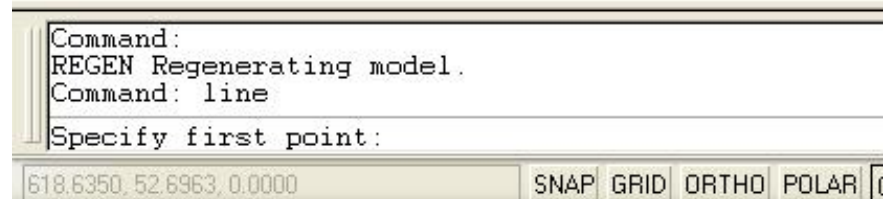The Polar **Coordinate System** uses the distance between points (length or magnitude) and the angle (direction or vector).

The **system** you use will depend upon the information you have.

Giving commands in AutoCAD……….

☐ **Command line**

☐ **Toolbars**
   (view/Toolbars)

☐ **Drop-down menus**
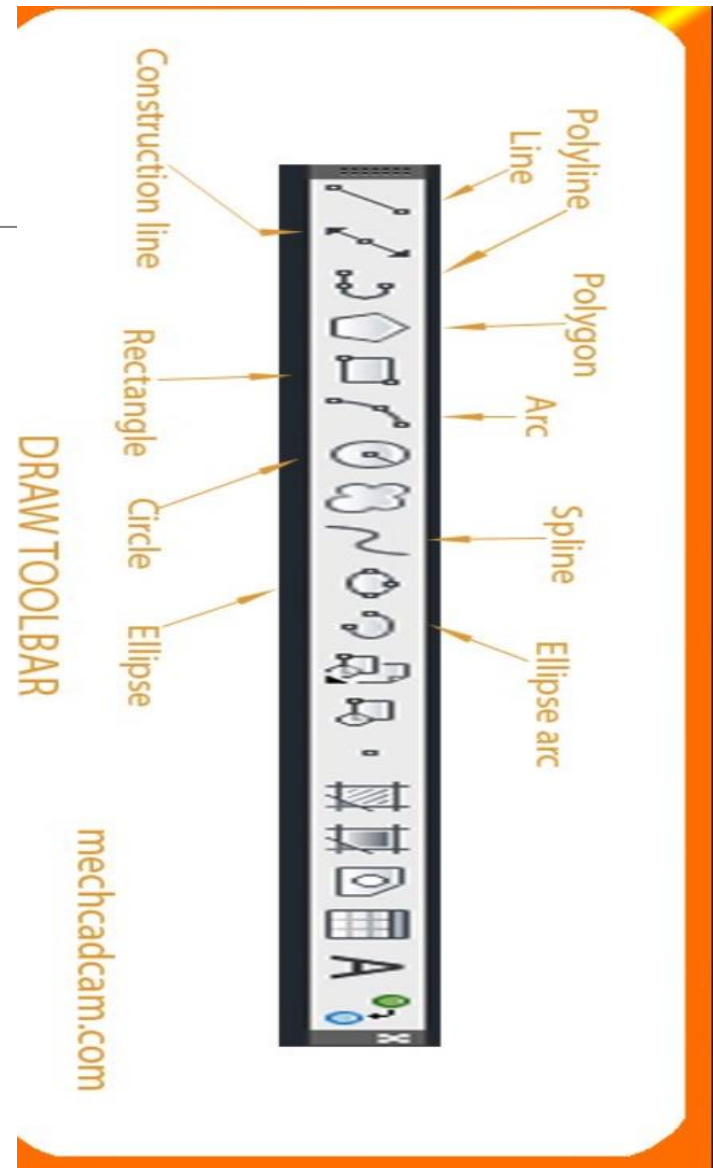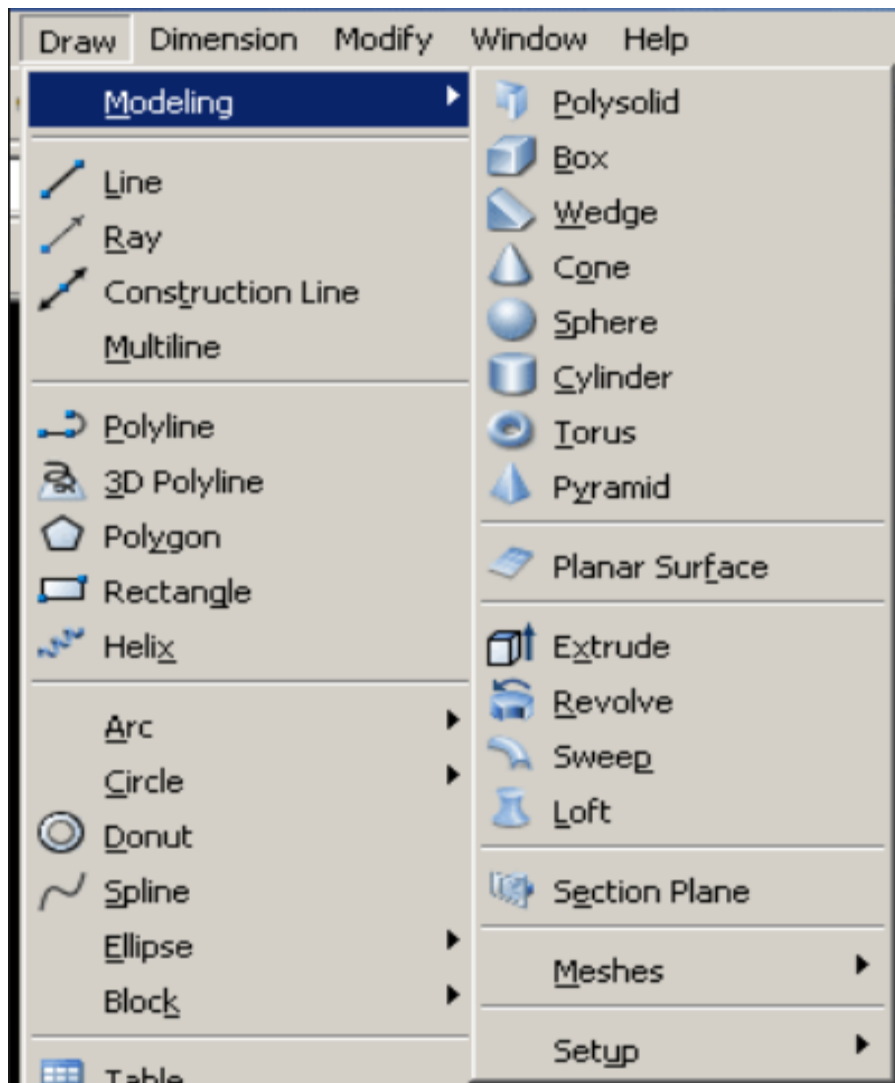   You can pick any
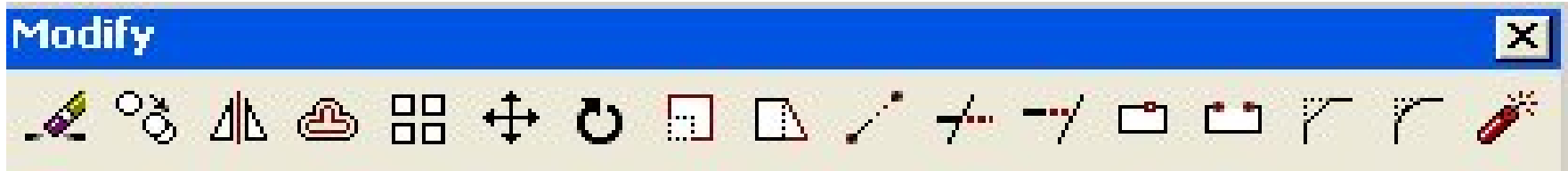   one(s) that you
 are comfortable with.

Type of commands in AutoCAD

- Drawing commands

- Modifying commands

- Dimensioning commands

- 3D commands

Drawing Commands

Draw menu with Modeling submenu, and Draw Toolbar reference.

Draw menu: Modeling ▶, Line, Ray, Construction Line, Multiline, Polyline, 3D Polyline, Polygon, Rectangle, Helix, Arc ▶, Circle ▶, Donut, Spline, Ellipse ▶, Block ▶, Table

Modeling submenu: Polysolid, Box, Wedge, Cone, Sphere, Cylinder, Torus, Pyramid, Planar Surface, Extrude, Revolve, Sweep, Loft, Section Plane, Meshes ▶, Setup ▶

DRAW TOOLBAR: Construction line, Polyline, Line, Polygon, Rectangle, Arc, Circle, Spline, Ellipse, Ellipse arc

mechcadcam.com

Modifying Commands

The modify tools (from left to right):
Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break at point, Break, Chamfer, Fillet, Explode
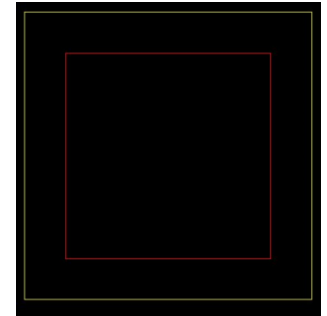
Erase - Select this button then a drawing element to erase it permanently from the drawing.

Copy - The copy command will copy any selected drawing elements and reposition where specified by the user, without affecting the original elements.
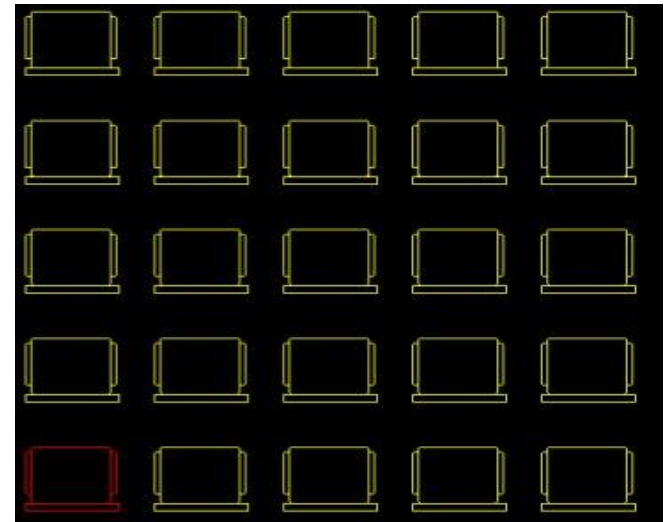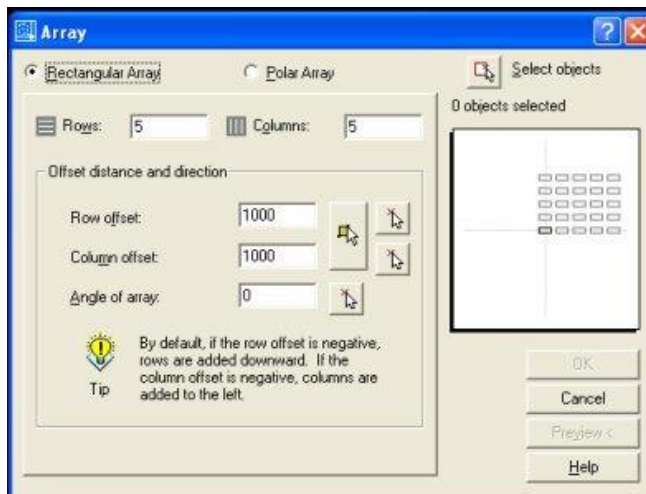
Mirror - The mirror command will create a mirror image of any selected drawing elements along any line of symmetry specified by the user.

Modifying Commands Contd….

Offset-Offset will make a copy of a line or series of selected lines by a specified distance in the direction specified.
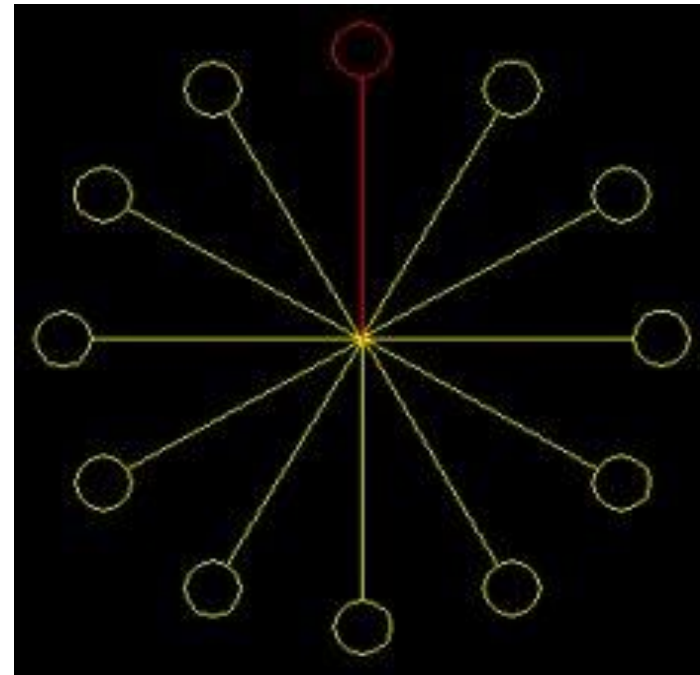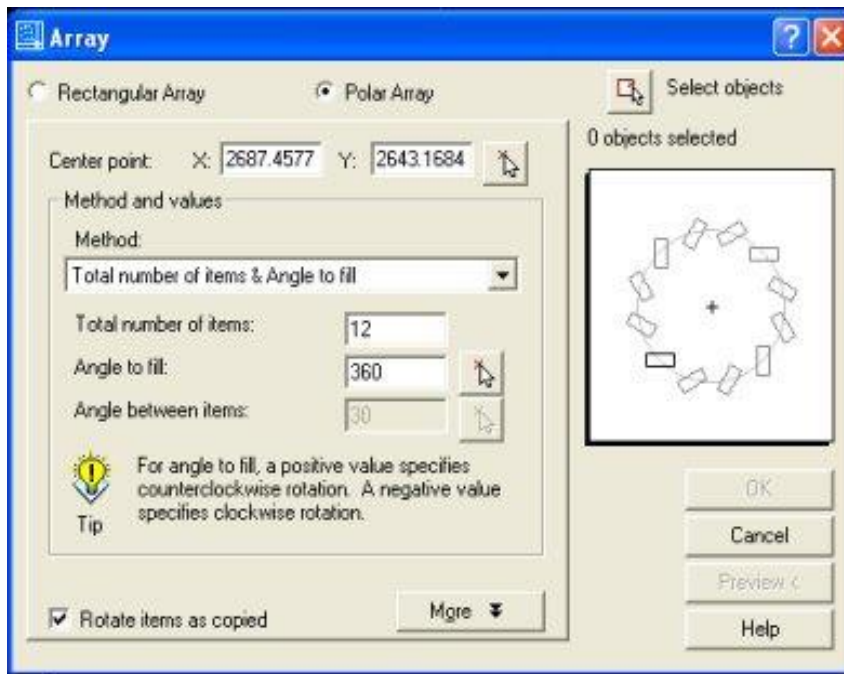
Array-The array command quickly creates copies of a selected object(s) to a specified spacing..

Modifying Commands Contd.

Polar Array-

Move: The move command works exactly the same as the copy command described above, except instead of creating a copy of the selected objects, the second objects are moved.
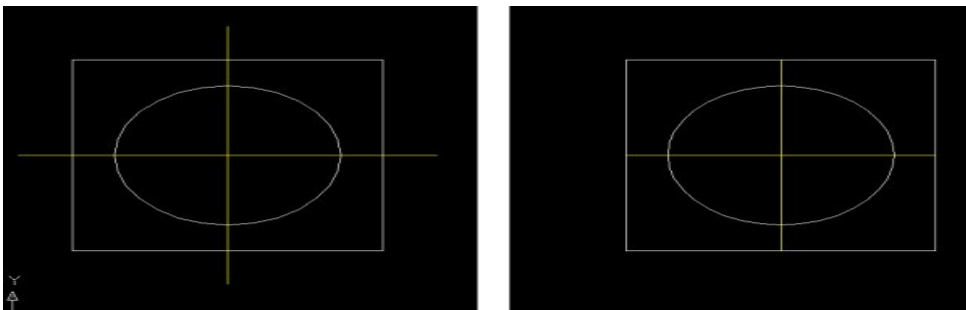
Modifying Commands Contd…….

Rotate- The rotate command rotates any selected objects about a defined point by the angle specified.

Scale: The scale command scales the size of a selected object(s) by a defined scale factor from a selected base point.
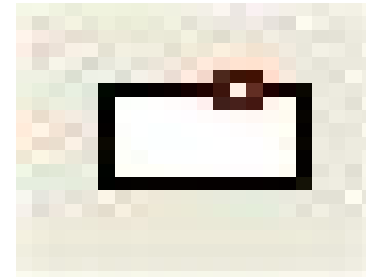
Extend: The lengthen command will lengthen a selected line.

Trim: The trim command is an extremely useful tool which will erase all parts of an object beyond or within its intersection with another object.
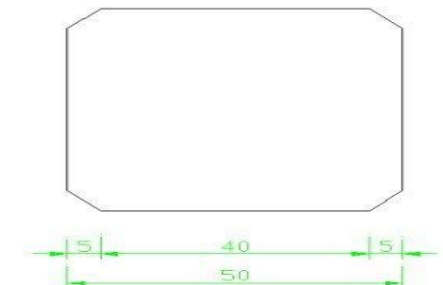
Modifying Commands Contd…….

Break: The break at point command enables the user to break an object at a specific point, creating two separate objects.
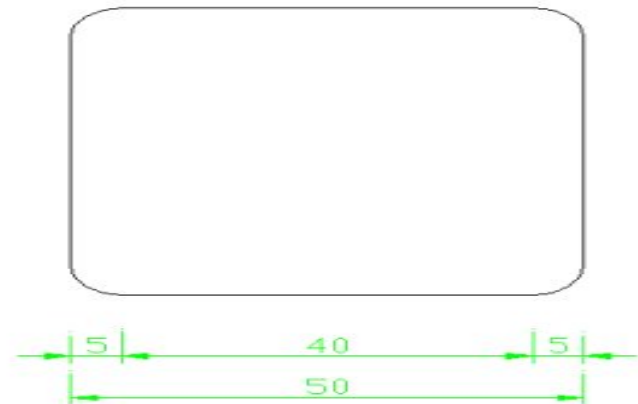
Chamfer: The chamfer command will chamfer the intersection of two lines to a specified distance.

Modifying Commands Contd…….

Fillet: The fillet command is very similar to the chamfer command above, Autocad creates a radius between the two points.

Explode: The explode command is very straight forward. It simply breaks down an object down to its basic line entities.

Dimensioning Practices

Dimensional information includes

- Size dimensions.

- Location dimensions.

- Notes.

Dimensioning Practices

Size Dimensions

◦ **Size dimensions provide the size of physical features.**

 ◦ **Diameter of holes**

 ◦ **Width**

 ◦ **Length**

 ◦ **Depth**

Dimensioning Practices
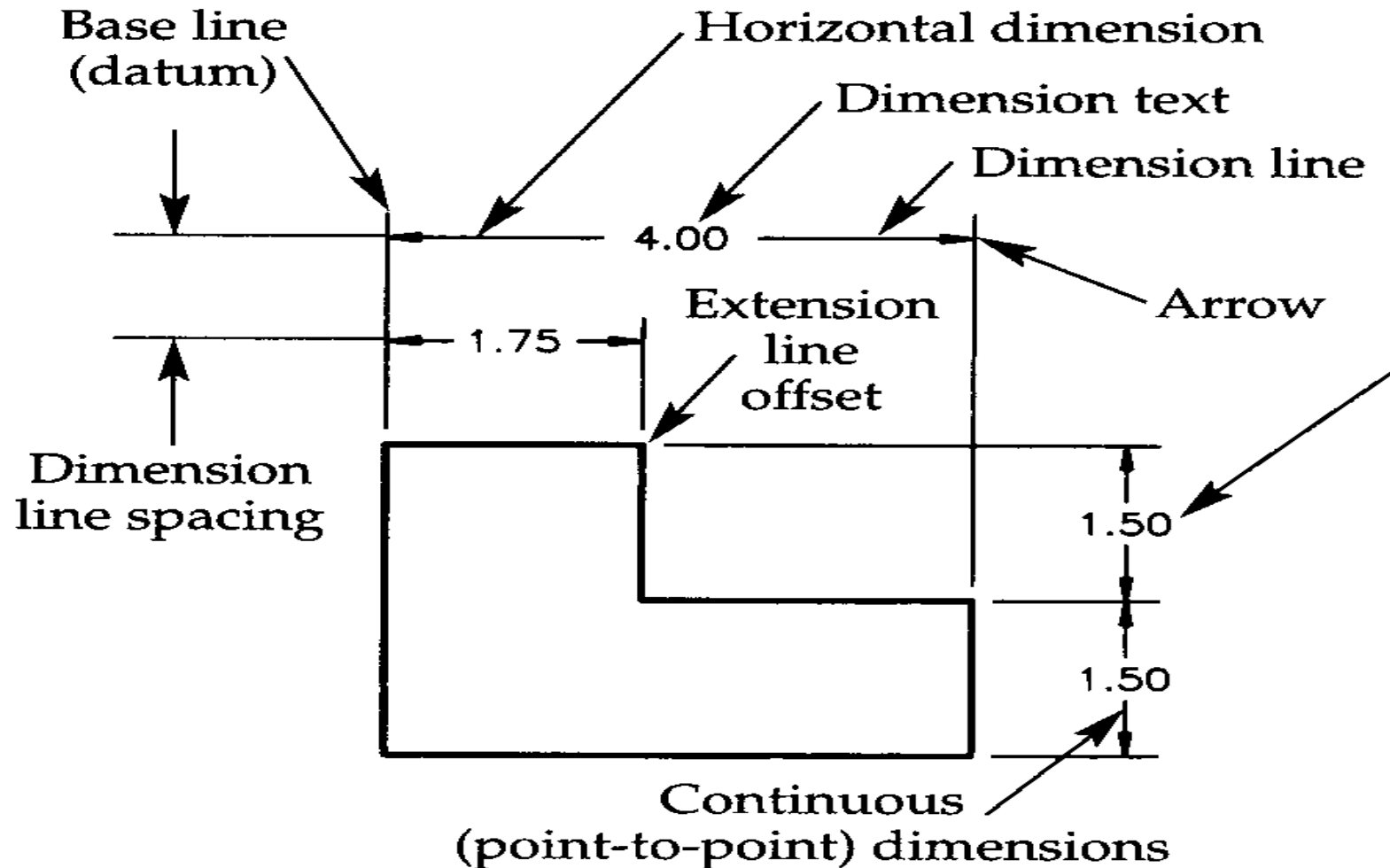
Location Dimensions

- Location dimensions provide the location of physical features.

  - Location of holes from end

    - Datum Dimensioning

    - Chain Dimensioning

  - Location of windows/doors in buildings
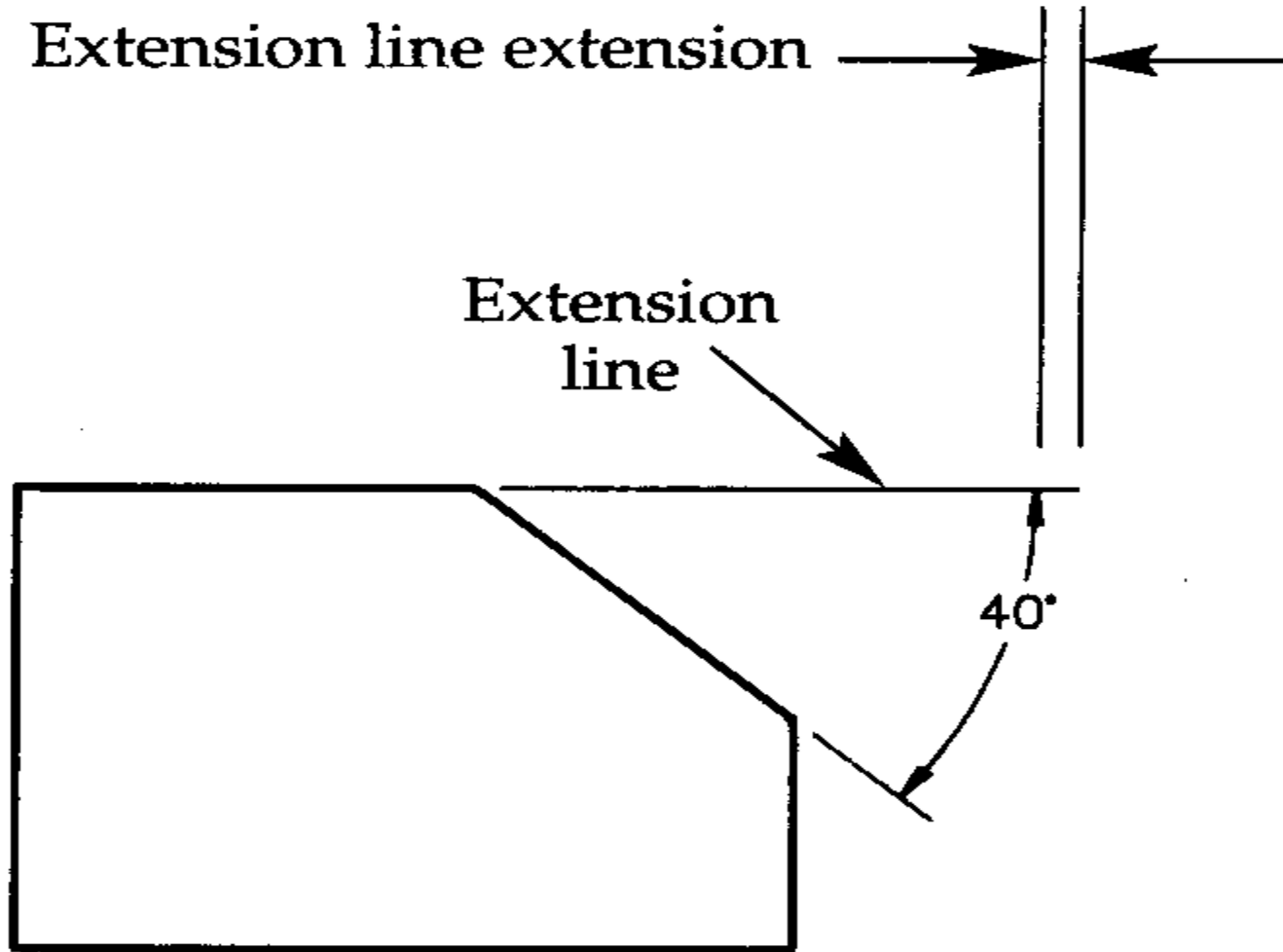
Dimensioning Practices

Notes

- **Notes** give information about individual or specific features on the drawing.
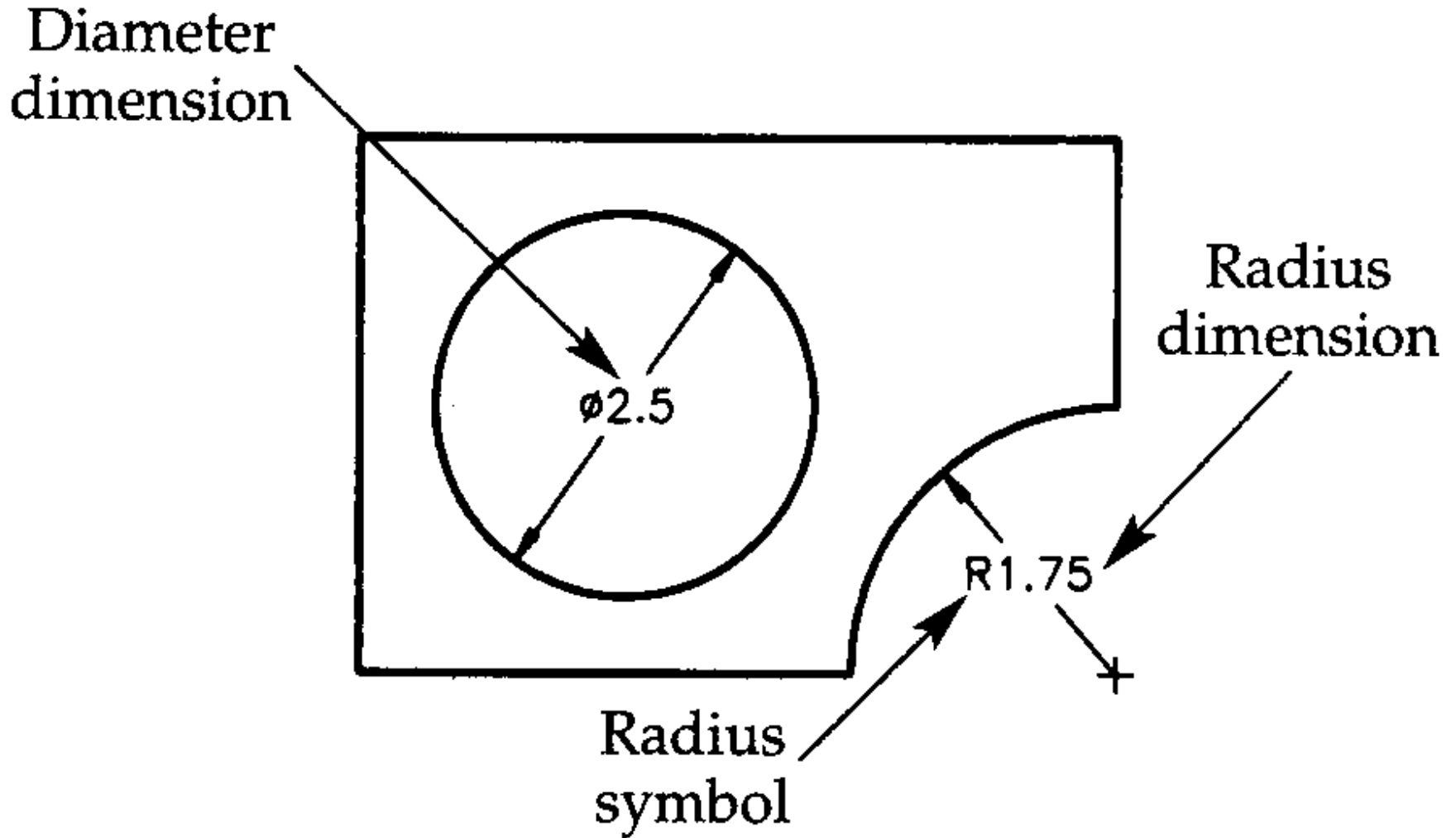
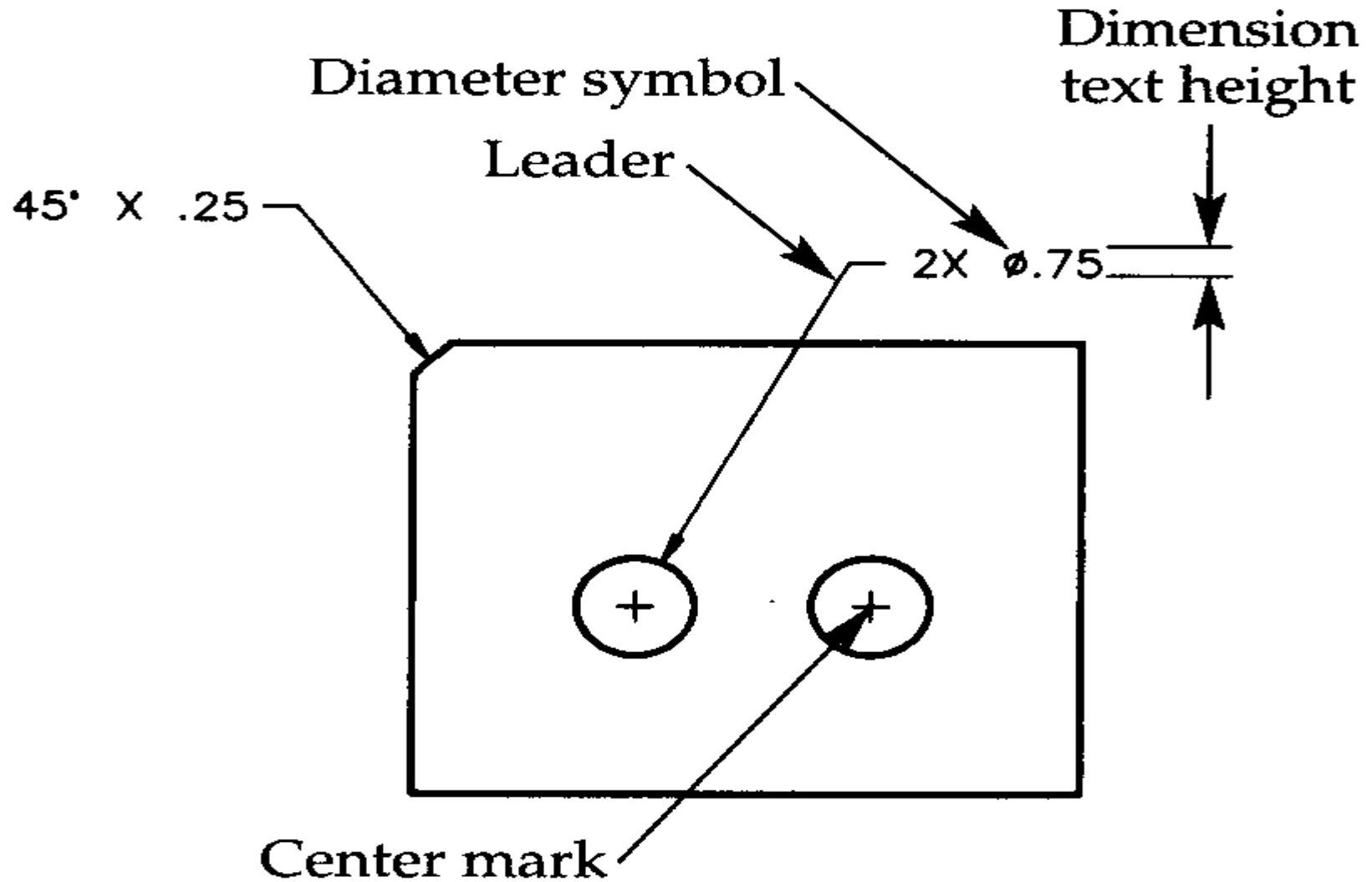- They are attached to the feature with a leader line.

Dimensioning Formats

Dimensioning Formats

Dimensioning Formats

Dimensioning Formats

Diameter symbol

Dimension text height

Leader

45° X .25

2X ⌀.75

Center mark

Dimensioning Commands

DLI — DIMLINEAR

DAL — DIMALIGNED

DAN — DIMANGULAR

DBA — DIMBASELINE

DCE — DIMCENTER

DCO — DIMCONTINUE

DED — DIMEDIT

DRA — DIMRADIUS

DDI — DIMDIAMETER

DOR — DIMORDINATE

DOV — DIMOVERRIDE

DST — DIMSTYLE

LE — LEADER

Useful Videos

AutoCAD Basic Tutorial for Beginners - Part 1 of 3 – YouTube

AutoCAD Basic Tutorial for Beginners - Part 2 of 3 – YouTube

AutoCAD Basic Tutorial for Beginners - Part 3 of 3 - YouTube

THANK YOU