

# Introduction to Technical Drawing

## Introduction

- What is Technical Drawing?
- Importance of Technical Graphics
- Course details

## Technical Drawing and Design

- Effective means of communicating technical ideas and solutions
- Design process steps
  - Visualization
  - Sketching
  - Geometrical models
  - Analysis
  - Detail drawing

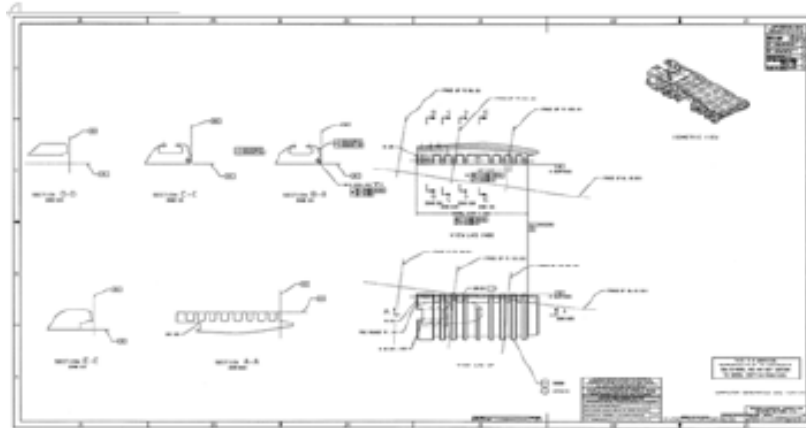
## Major activities of Engineering



25%	Drafting and Documentation
19%	Manufacturing Engineering
25%	Functional Design
15%	Engineering Analysis
16%	Other

Courtesy: Technical Graphics  
Communication, Bertoline, 2003

# Engineering Drawing



Courtesy: Technical Graphics  
Communication, Bertoline, 2003

## Importance of Technical Graphics

- Technical Graphics is a language used for
  - Visualization
  - Communication
  - Documentation

## Geometry

- Solid geometry
  - the geometry of three-dimensional objects, such as cylinders, cubes and spheres, and their relationships.
- Analytical geometry
  - the analysis of geometric structures and properties, principally using algebraic operations and position coordinates.
- Descriptive geometry
  - the science of analyzing and solving space distances and relationships, using graphics.

## Geometry

- Plane
  - Planar figures such as circles, and polygons
- Solid
  - 3D objects such as cylinders

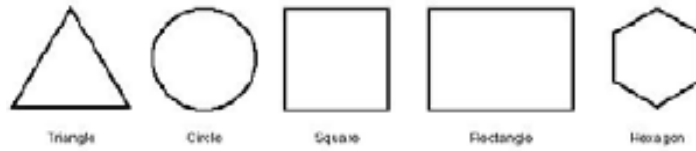


Fig. 1.22

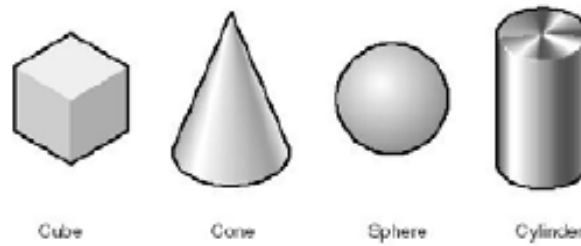


Fig. 1.23

Courtesy: Technical Graphics  
Communication, Bertoline, 2003

## Technical Drawing

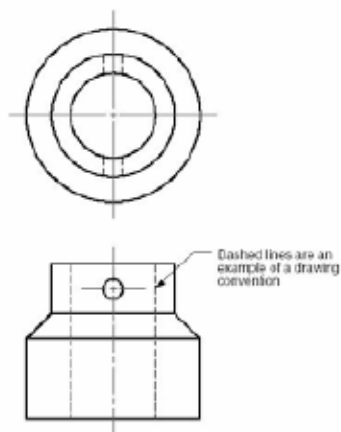
### Drawing methods

- Free hand
- Mechanical
- Computer
- Projection techniques
- Standards
- Precise language

## Technical Graphics or Technical Drawing

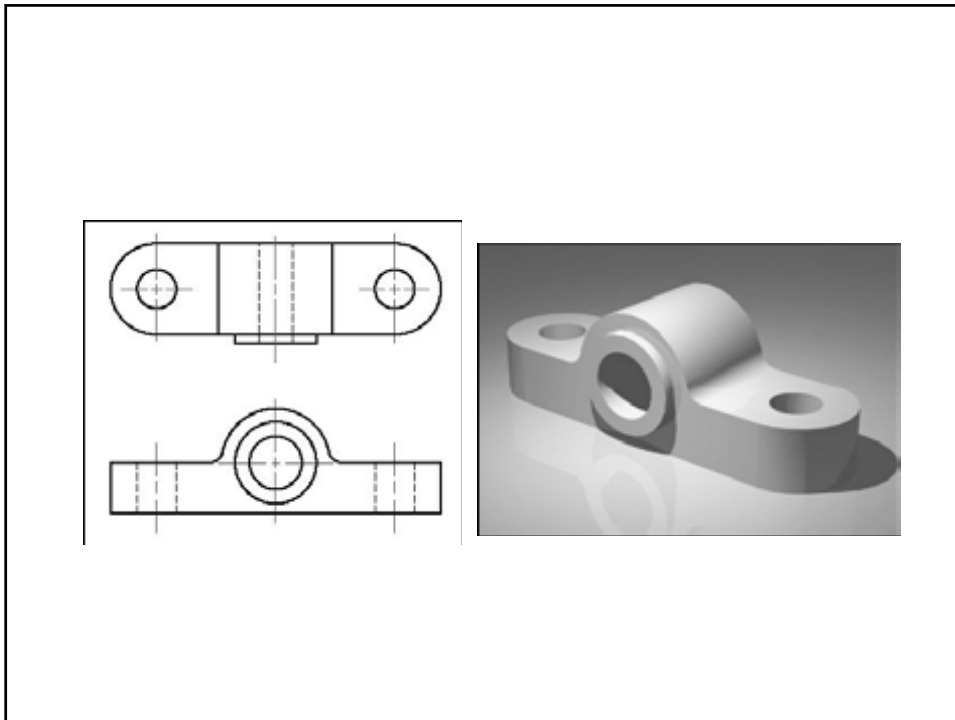
- Communicate technical information
- Geometry is the foundation of the technical graphics
- Standards and Conventions
  - ANSI Y14.1-1980
  - ANSI Y14.2M-1979
  - .....

Drawing conventions



Courtesy: Technical Graphics  
Communication, Bertoline, 2003

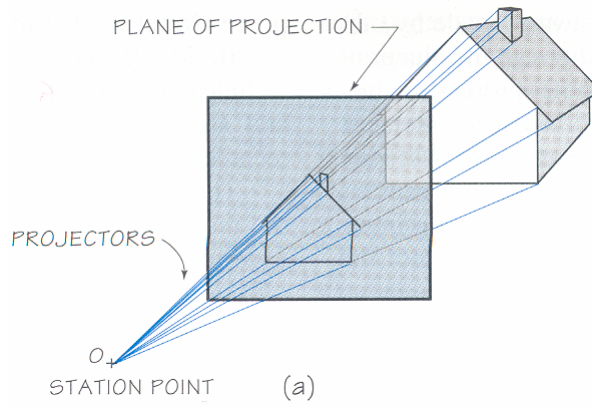




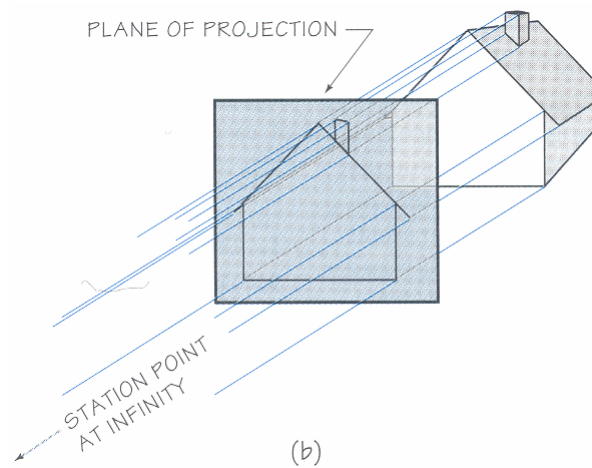
## Projections

- Every drawing involves the spatial relationship of four things:
  1. The observer's eye, or the station point
  2. The object
  3. The plane of projection
  4. The projectors, also called visual rays or lines of sight

# Projections



# Projections



## Classification by Projectors

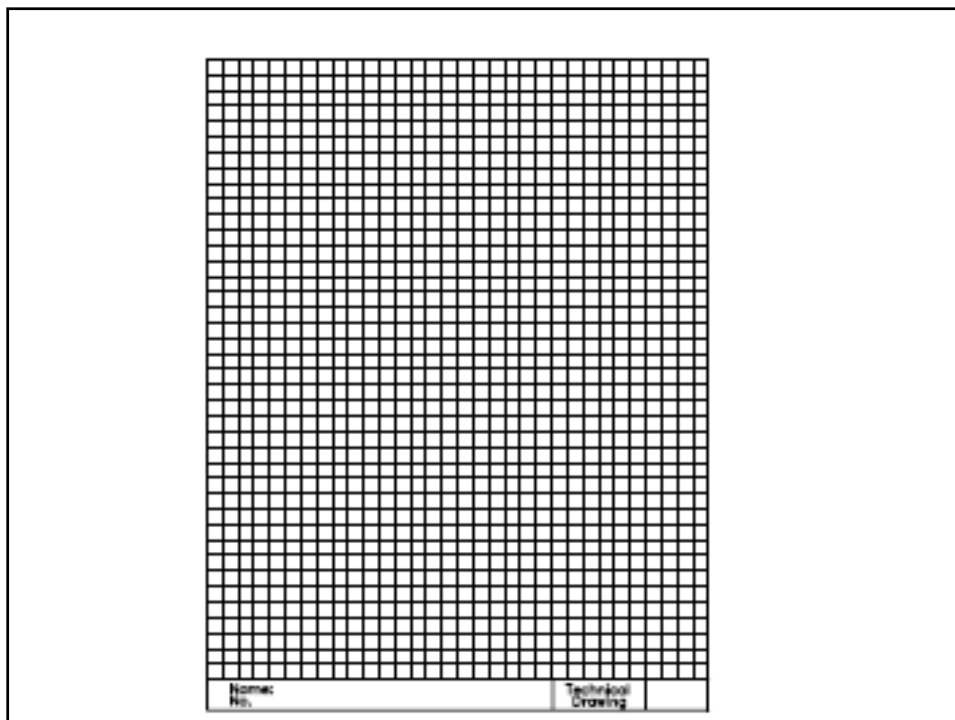
Classes of Projection	Distance from Observer to Plane of Projection	Direction of Projectors
Perspective	Finite	Radiating from station point
Parallel	Infinite	Parallel to each other
Oblique	Infinite	Parallel to each other and oblique to plane of projection
Orthographic	Infinite	Perpendicular to plane of projection
Axometric	Infinite	Perpendicular to plane of projection
Multiview	Infinite	Perpendicular to planes of projections

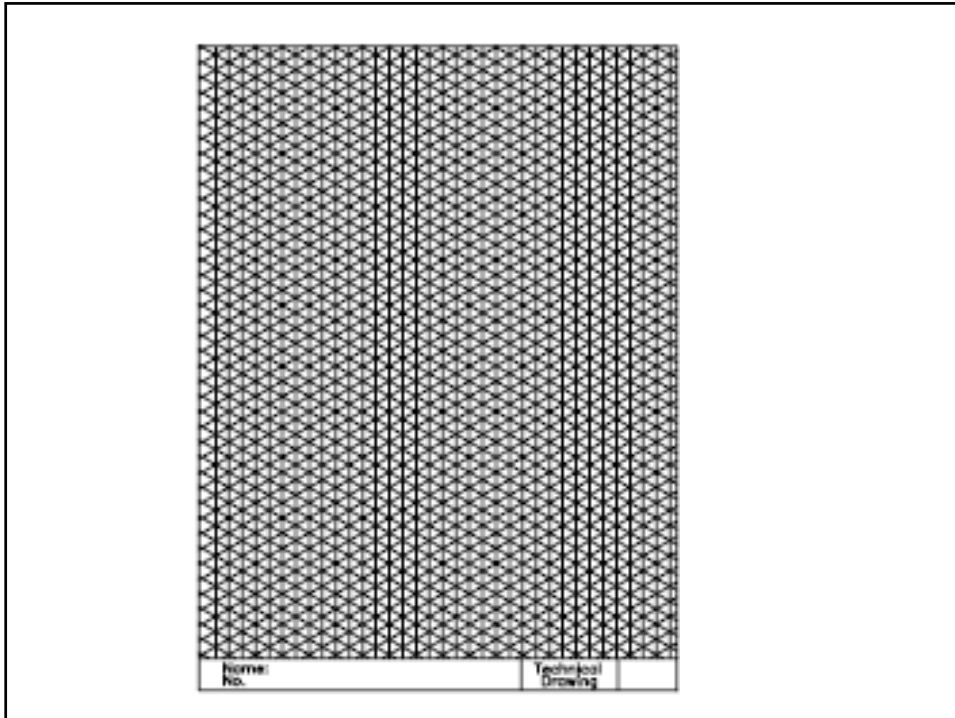
## EQUIPMENT AND SUPPLIES

- **CAD software:** AutoCAD will be available in the computer lab.
- Majority of the exercises will be done using AutoCAD.

## EQUIPMENT AND SUPPLIES

- **Sketching paper:** Students will be sketching (rectangle and isometric) many assignments.
- It will be very helpful to have sketch paper with the necessary grids to guide the sketching.





## Sheet Layouts

A convenient code to identify American National Standard sheet sizes and forms suggested by the authors for title, parts or material list, and revision blocks, for use of instructors in making assignments, is shown here. All dimensions are in inches.

Three sizes of sheets are illustrated: **Size A**, Fig. I, **Size B**, Fig. V, and **Size C**, Fig. VI. Metric size sheets are not shown.

Eight forms of lettering arrangements are suggested, known as **Forms 1, 2, 3, 4, 5, 6, 7, and 8**, as shown below and opposite. The total length of **Forms 1, 2, 3, and 4** may be adjusted to fit **Sizes A4, A3, and A2**.

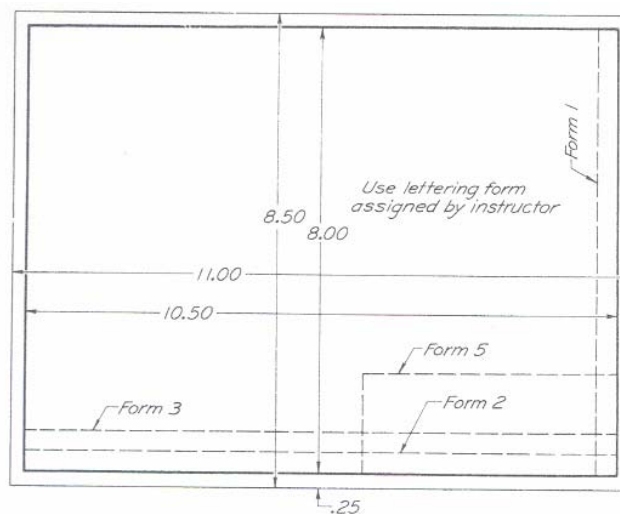
The term **layout** designates a sheet of certain size plus a certain arrangement of lettering. Thus **Layout A-1** is a combination of **Size A**, Fig. I, and **Form 1**, Fig. II. **Layout C-678** is a combination of **Size C**, Fig. VI, and **Forms 6, 7, and 8**, Figs. IX, X, and XI. **Layout A4-2** (adjusted) is a combination of **Size A4** and **Form 2**, Fig. III, adjusted to fit between the borders. Other combinations may be employed as assigned by the instructor.

## Sheet Sizes

Nearest International Size <sup>a</sup> (Millimeter)	Standard U.S. Size <sup>a</sup> (Inch)
A4 219 X 297	A 8.5 X 11.0
A3 297 X 420	B 11.0 X 17.0
A2 420 X 594	C 17.0 X 22.0
A1 594 X 841	D 22.0 X 34.0
A0 841 X 1189	E 34.0 X 44.0

<sup>a</sup> ANSI Y14.1m-1992

## Sheet Layouts

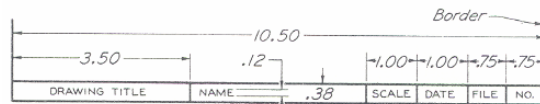


**Fig. I** Size A Sheet (8.50" × 11.00")

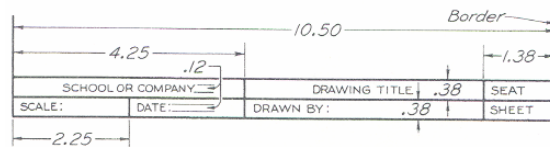
# Sheet Layouts



**Fig. II Form 1. Title Block**

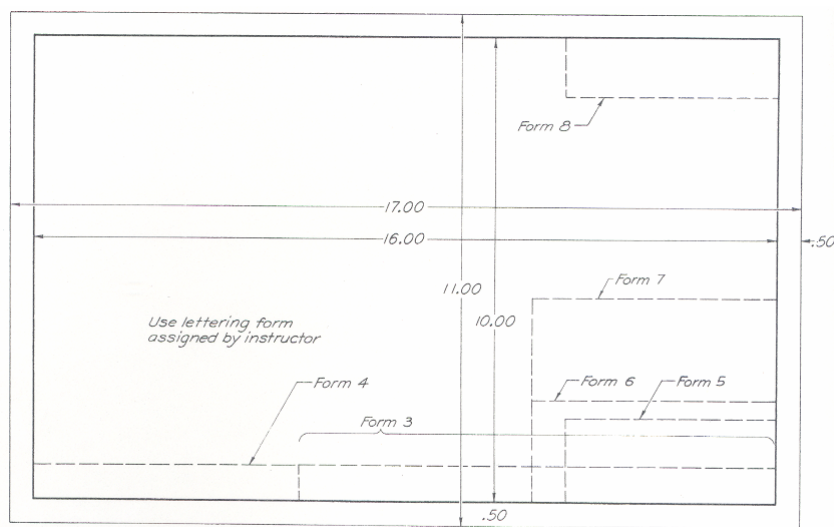


**Fig. III Form 2. Title Block**



**Fig. IV Form 3. Title Block**

# Sheet Layouts



**Fig. V Size B Sheet (11.00" x 17.00")**

# Sheet Layouts

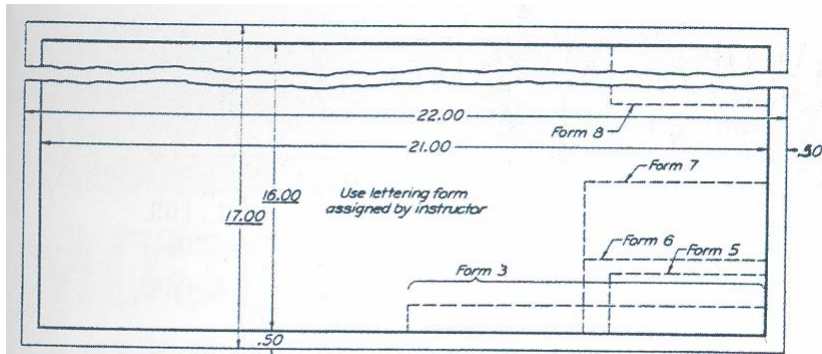


Fig. VI Size C Sheet (17.00" × 22.00")

# Sheet Layouts

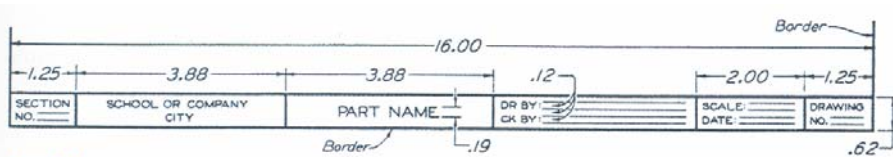


Fig. VII Form 4. Title Block

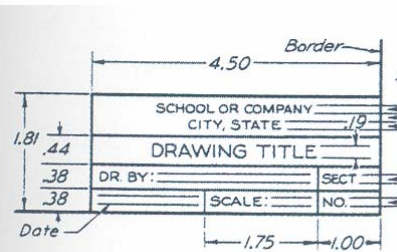


Fig. VIII Form 5. Title Block

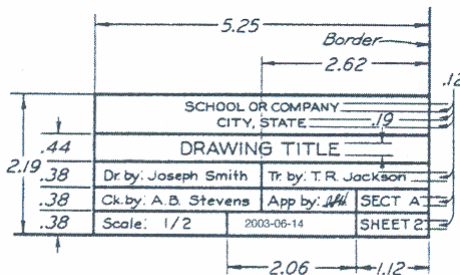


Fig. IX Form 6. Title Block

# Sheet Layouts

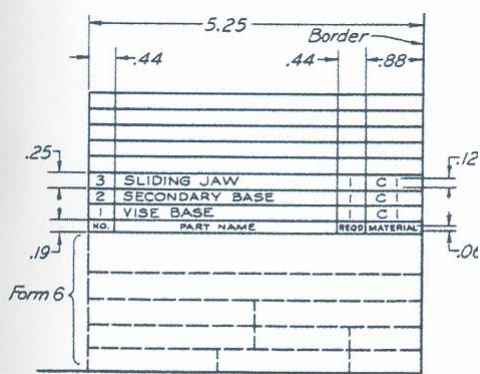


Fig. X Form 7. Parts List or Material List

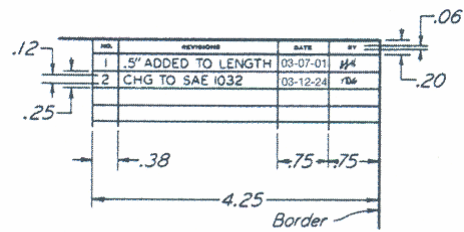


Fig. XI Form 8. Revision Block