

# Engineering Drawing (E 122)

## LECTURE NOTES

### 1 INTRODUCTION

### 2 DRAFTING BASICS --- GEOMETRY & SHAPE DESCRIPTION

### 3 ORTHOGRAPHIC VIEWS & CAD I

#### I. Preliminaries

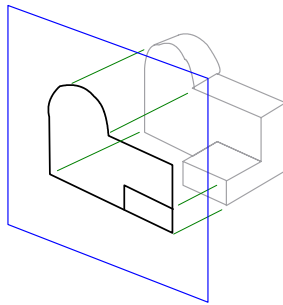
A. (CT brings – Foam part, camera)

B. Last time

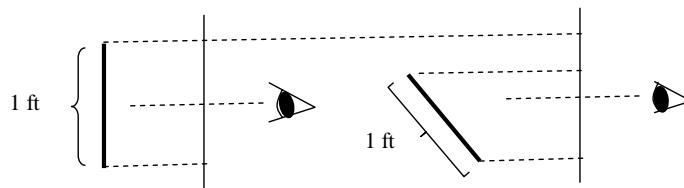
1. Sketching, lettering, sheet formats, scale, line types
2. Geometry, projection, surfaces, line rules

#### II. Theory of projection for 1 view

A. Recall –



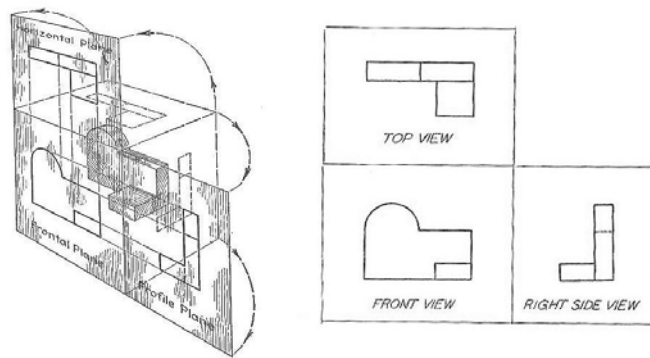
B. Foreshortening – if lines of the object that are not \_\_\_\_\_ with viewing plane, but instead \_\_\_\_\_ in direction away from viewer, they appear shorter than they really are (think of lines in the road)



#### III. Third angle projection

A. Glass box concept

1. Imagine the part suspended and \_\_\_\_\_ inside a \_\_\_\_\_.
2. Project \_\_\_\_\_ lines of sight onto the \_\_\_\_\_ to create different \_\_\_\_\_ of the part on each side.
3. \_\_\_\_\_ the box to get the \_\_\_\_\_ as seen from \_\_\_\_\_.



Third-angle Projection

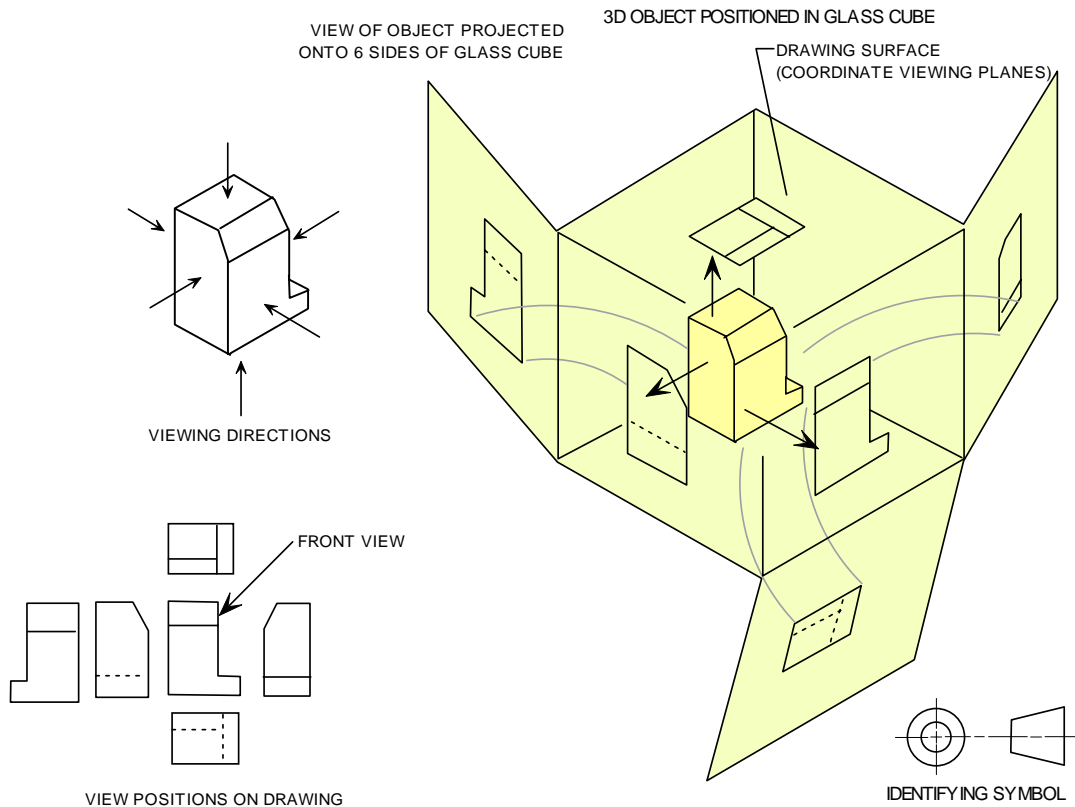
**B. Result**

1. Top view is placed \_\_\_\_\_ the front view.
2. Right side view is placed to the \_\_\_\_\_ of the front view.

C. \_\_\_\_\_ (American National Standards Institute) – used in \_\_\_\_\_.

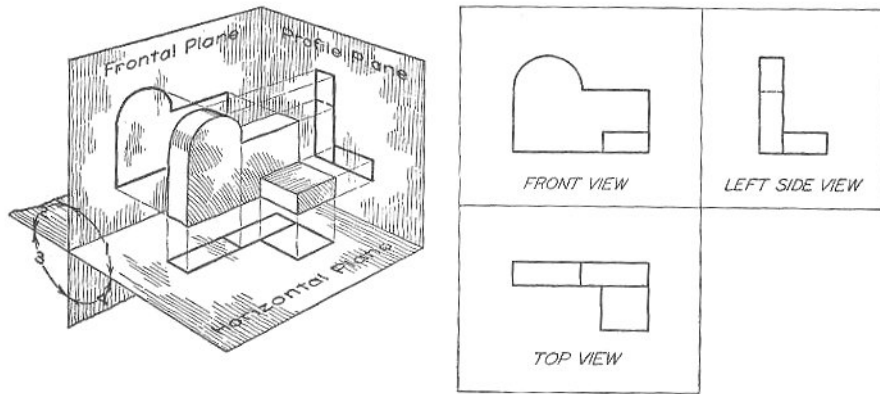
**D. Ways to think of it:**

1. Rolling the part \_\_\_\_\_ table to see the different sides
2. Swinging the “\_\_\_\_\_” (or back side).



#### IV. First angle projection

- A. Still use glass box concept.
- B. Project in \_\_\_\_\_ direction – \_\_\_\_ the part to the \_\_\_\_ side.
- C. Unfold box – look at resulting views on \_\_\_\_\_ of box sides.
- D. Result
  - 1. Top view is \_\_\_\_\_ the front view.
  - 2. Right view is \_\_\_\_\_ of the front view.

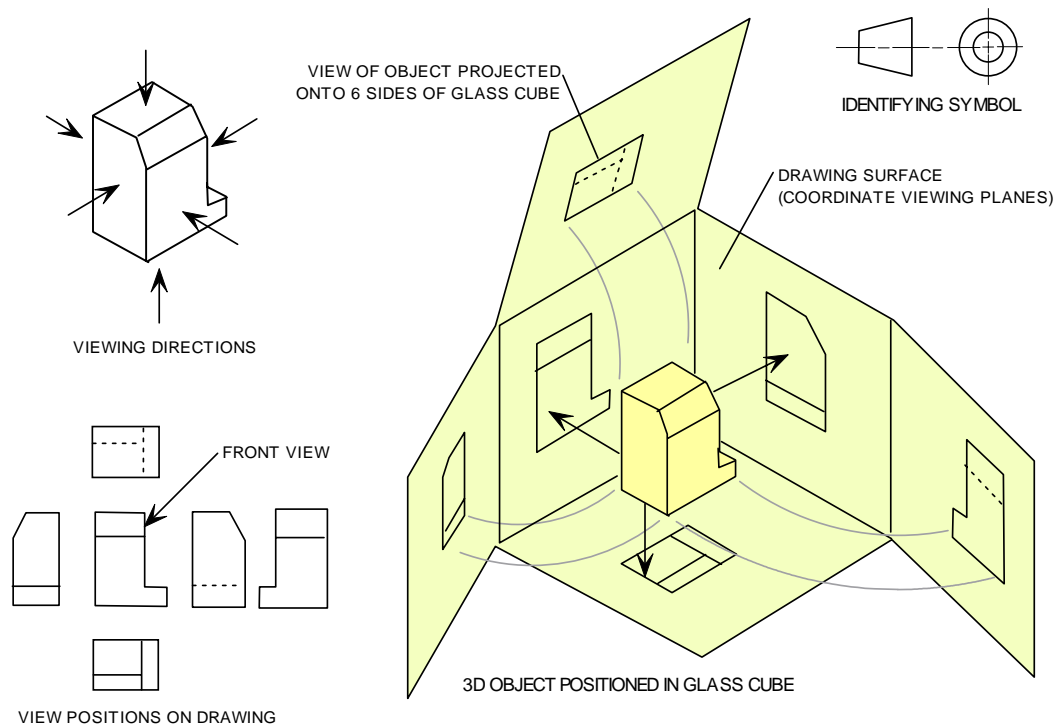


First-angle projection.

E. \_\_\_\_\_ (Europe & Asia)

F. Ways to think of it:

- 1. Roll the part \_\_\_\_\_ glass table to see the different sides.
- 2. Swinging the \_\_\_\_\_ (or front).



#### V. Comparing first and third angle projection

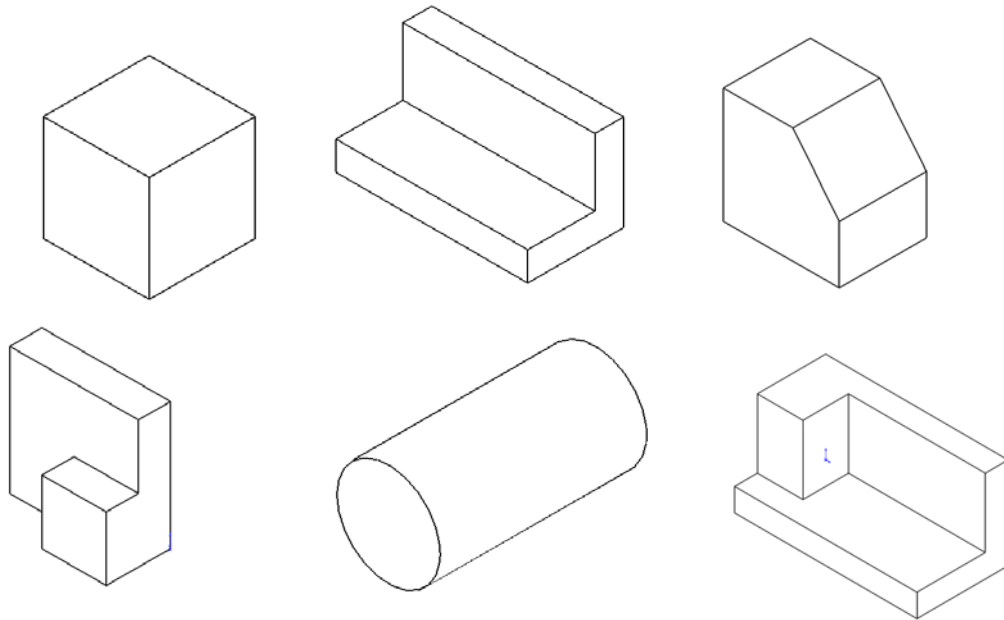
- A. Individual views are exactly the SAME between 1st and 3rd angle. Only the \_\_\_\_\_ of the views relative to each other are different.

## VI. Lesson

- A. There is a correct \_\_\_\_\_ and \_\_\_\_\_ for views (you don't just put the views wherever you feel like it).
- B. We will use  $\searrow$  \_\_\_\_\_ projection.

## VII. Orthographic practice (simple parts)

- A. First step – mark each flat surface as follows
  1. F – surfaces that “face” the front plane
  2. T – surfaces that “face” the top plane
  3. R – surfaces that “face” the right plane
  4. TR – surfaces that can be seen in the top & right views (but don't face any plane directly).
  5. FR – surfaces that can be seen in the front & right views (& don't face any plan
  6. TRF – surfaces can be seen in top, right, and front views.
- B. Note
  1. Surfaces with 1 letter are \_\_\_\_\_.
  2. Surfaces with 2 letters are \_\_\_\_\_.
  3. Surfaces with 3 letters are \_\_\_\_\_.



## C. Practice with slightly tougher parts

## VIII. AutoCAD Intro (see handout) (week 3)

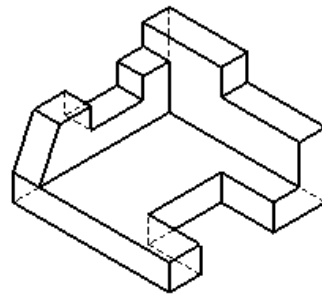
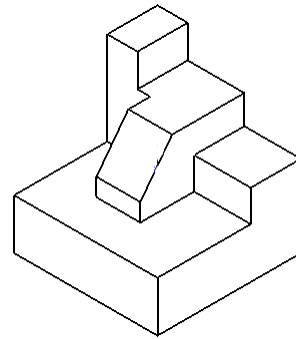
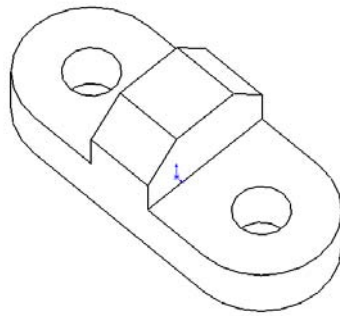
- A. Topics: intro, opening, classic setup, mouse, coordinates, line, select, erase, undo, zoom, pan, plot, save, exiting

## 4 ORTHOGRAPHIC PRACTICE & CAD II

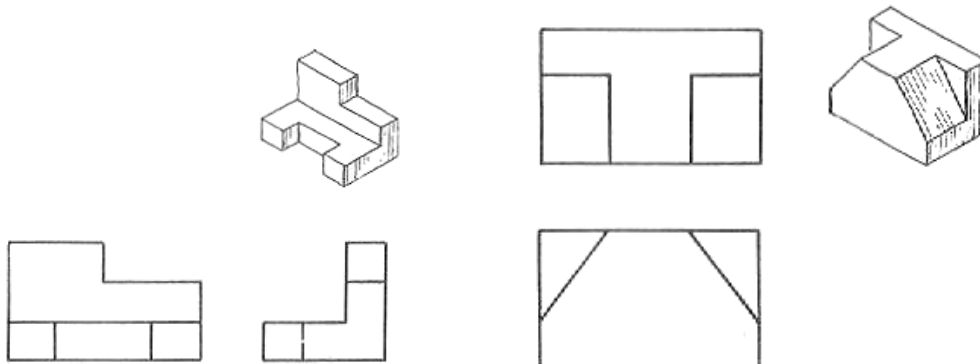
### I. Preliminaries

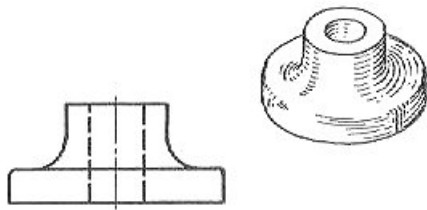
- A. (CT brings – wood parts)
- B. Roll,
- C. Review
  - 1. Orthographic views
  - 2. First & Third angle projection
  - 3. Orthographic view practice

### II. Tougher parts

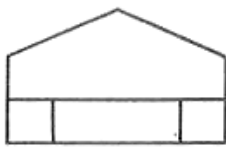
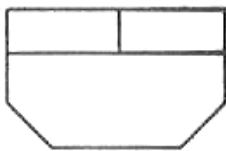
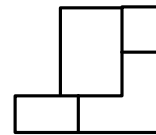
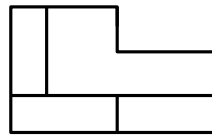
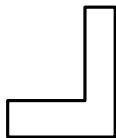
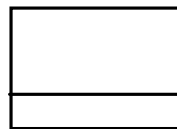
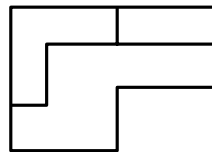
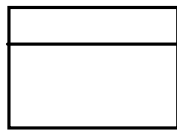


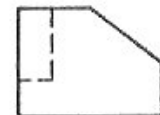
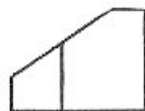
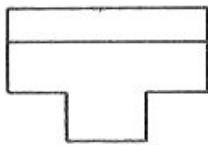
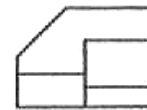
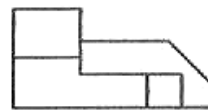
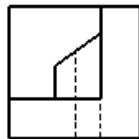
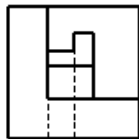
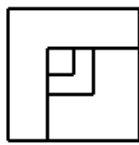
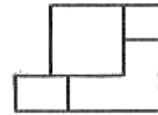
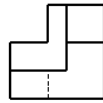
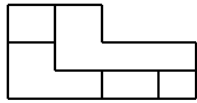
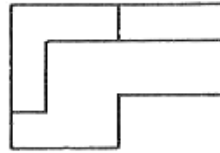
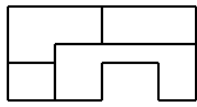
### III. With missing views





IV. With isometric missing





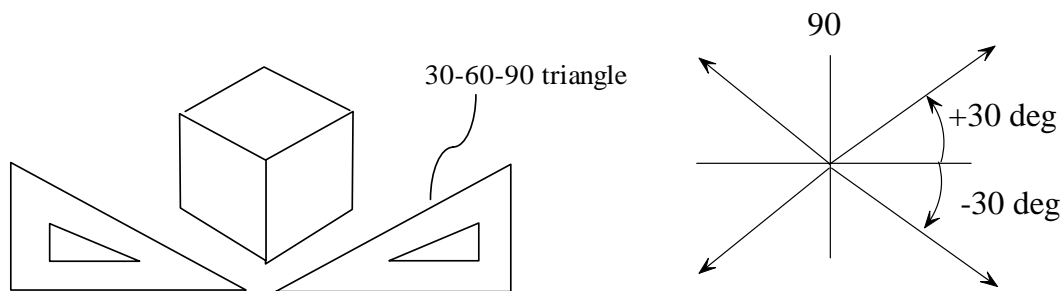
## V. Hints

- A. The face or surface that appears in a view does not necessarily \_\_\_\_\_ the viewing plane (i.e., it may not directly \_\_\_\_\_, but instead may \_\_\_\_\_ away from the viewer).
- B. Keep the views and features \_\_\_\_\_ (use light guide lines to help)
- C. Start with the overall shape first
- D. Fill in details last

## VI. Isometric drawings

### A. Pencil, triangle

1. Use 30-60-90 triangle
2. Only measure distances on the polar clock



## VII. AutoCAD Intro (refer to AutoCAD handout) (week 4)

- ### A. Topics: template, layers, toolbars, polar entry, circle, rec, move, copy, osnap, tracking, trim, extend



## 5 ORTHO PRACTICE II & CAD III

### I. Orthographic practice (tough parts)

COME UP W/ SOME TOUGH PARTS!

### II. AutoCAD (see AutoCAD handout) (week 5)

- #### A. Isometric drawings, isometric ellipse
- #### B. Do hw 5 on AutoCAD

### III. Exam Review

- #### A. Closed book, closed notes, based on lecture, fill-in-blank, multiple choice, dwgs

#### B. Lecture 1

1. Syllabus stuff – no
2. How to be a good student – no
3. Branches of Engineering Graphics – YES (name 5)
4. Definition of engineering – YES
5. Engineers design – YES (products & tooling)
6. Good & poor design – YES
7. Communicating design to whom? YES (name 4)
8. Communicating design how? YES (verbal, sketch, pencil, cad) – name 4
9. CAD programs – YES name 4 (autocad, solidworks, proe, catia)
10. Advantages of 3D parts – no

C. Lecture 2

1. Lettering – YES (use of guidelines, letter style)
2. Board drafting – no
3. Using the scale – no
4. Sheet formats – YES
5. Line types – YES
6. Drawing layout – YES (managing space)
7. Isometrics – YES (using 30/60/90)
8. Geometry of shapes – no (1D, 2D, 3D)
9. Geometric relations – YES ( $\perp$ , //, projection)
10. Theory of projection – YES
11. Surface types (principal (FRT), inclined, oblique) – YES
12. Surface views – YES (name 3, true size, foreshortened, edge view)
13. Lines rules – YES
14. Line precedence – no

D. Lecture 3

1. Third and first angle orthographic projection – YES
2. ASME/ ISO – YES

E. Lecture 4

1. Orthographic practice – YES

F. Lecture 5

1. AutoCAD – no

6 REVIEW, EXAM 1 -----