

# AutoCAD

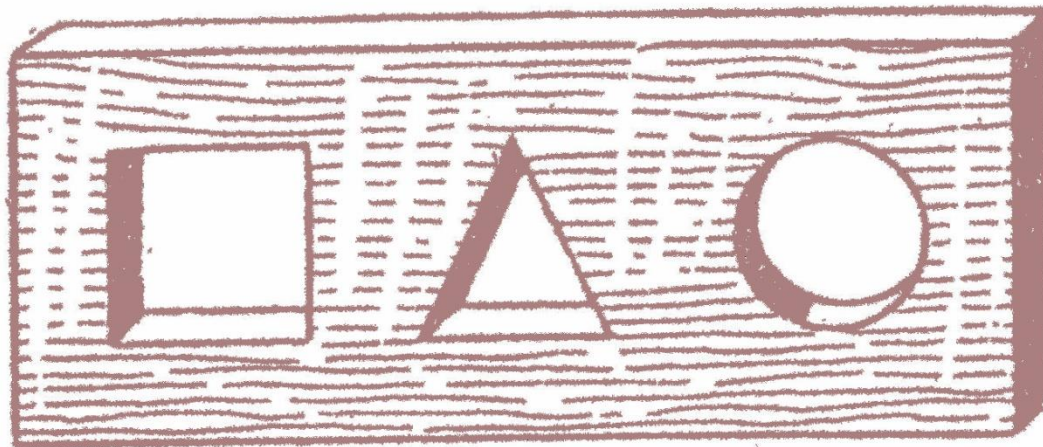
David Rey

School of Civil and Environmental Engineering

April 2017

# CAD lecture 2

- Engineering drawing
  - Views
  - Layout
  - Australian standards
- CAD
  - Object snaps
  - Tools for breaking and extending lines
  - Parallel lines



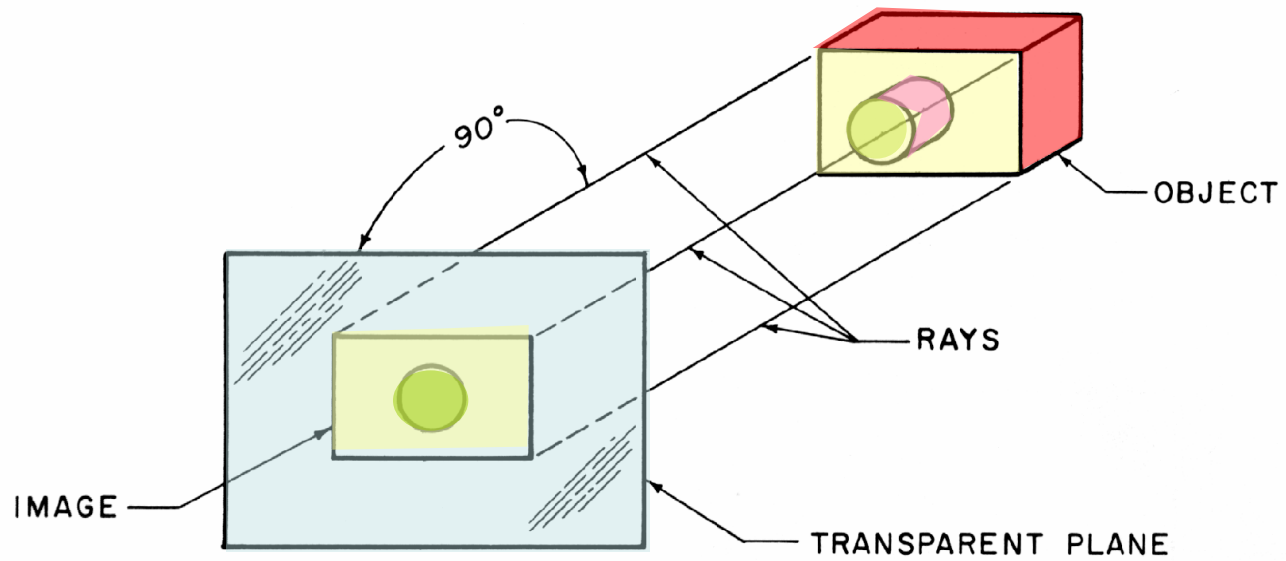
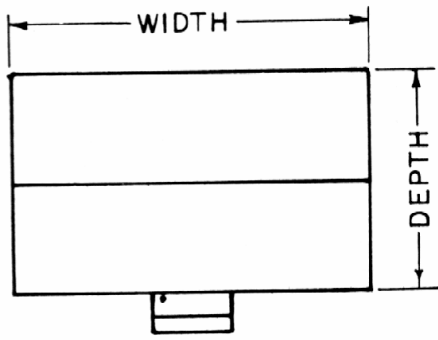
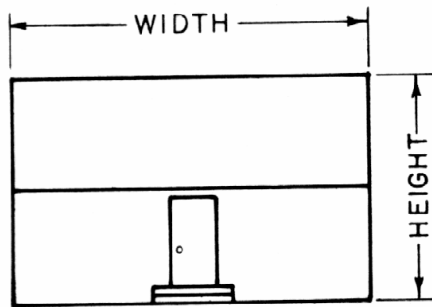


Fig. 4.1 Orthographic projection

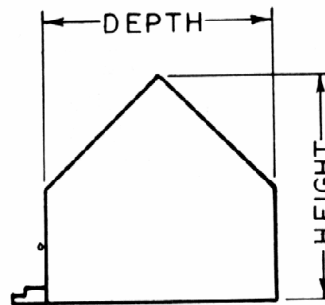
Source : Cook (1985)



TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

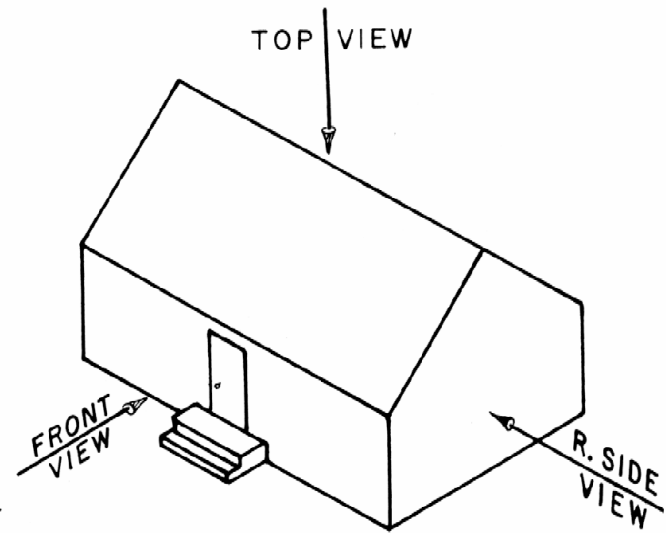
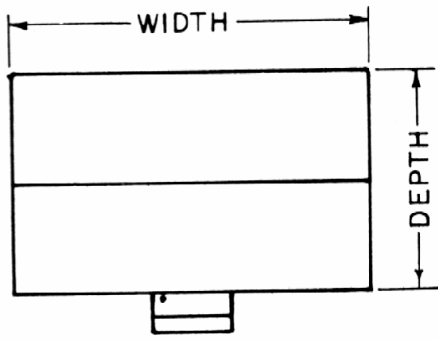
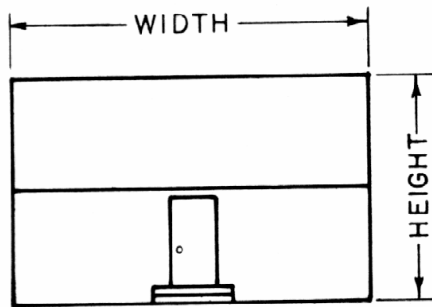


Fig. 4.8 Dimensions shown in each view

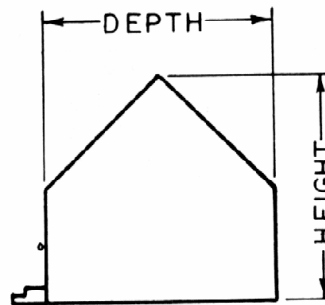
Source : Cook (1985)



TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

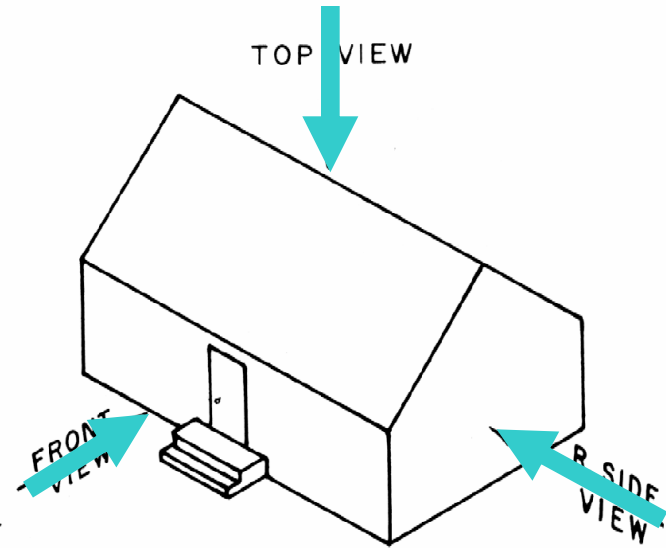


Fig. 4.8 Dimensions shown in each view

Source : Cook (1985)

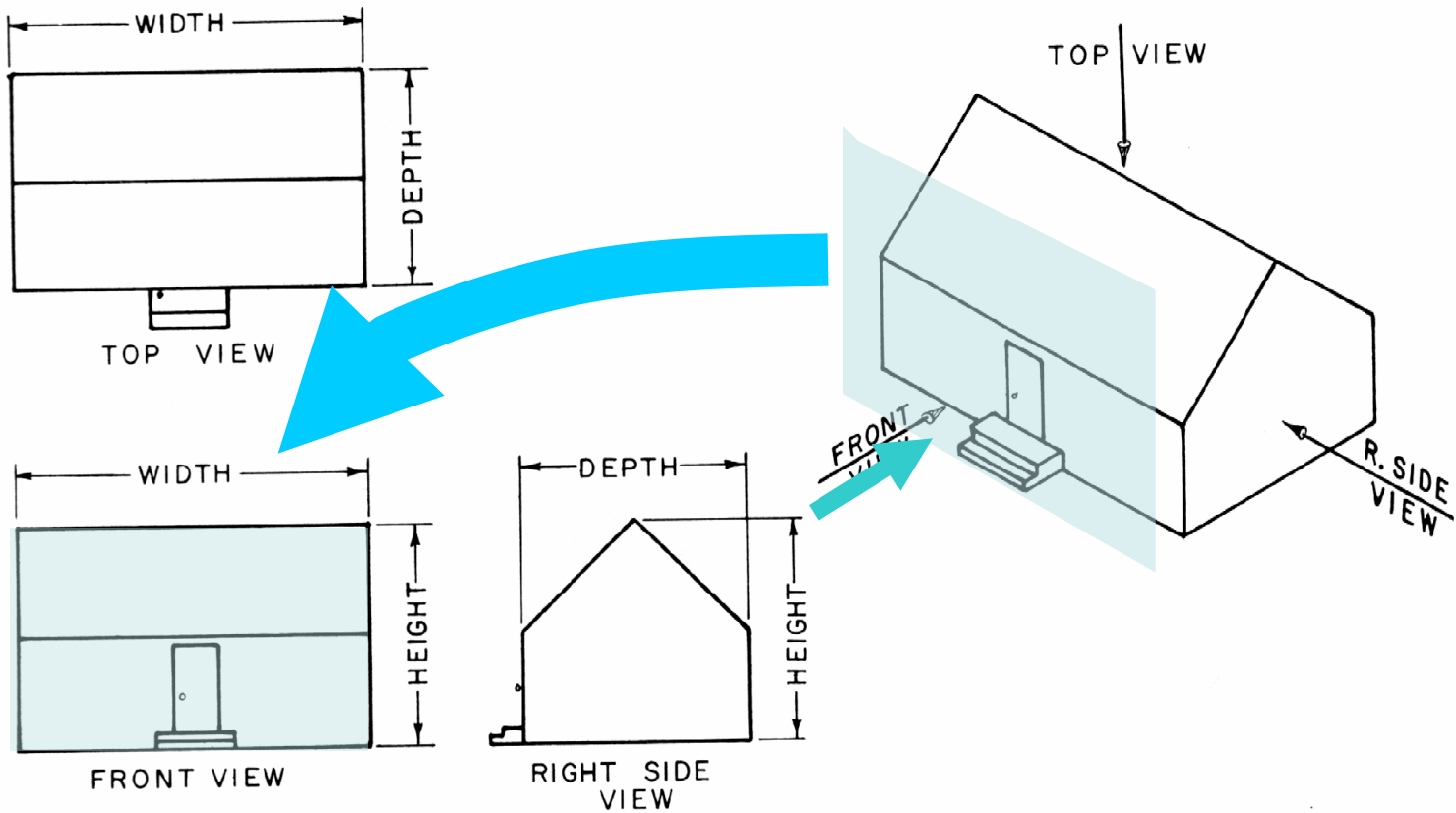


Fig. 4.8 Dimensions shown in each view

Source : Cook (1985)

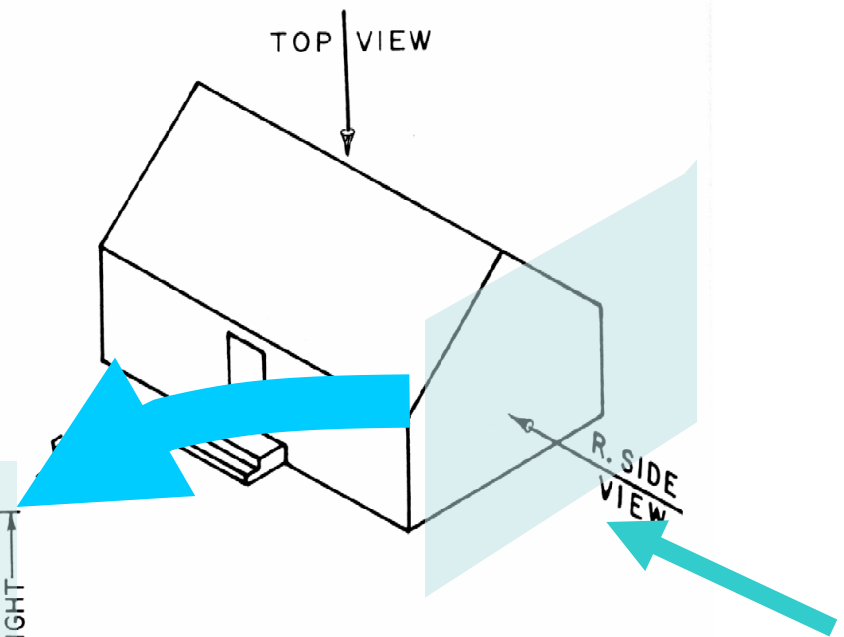
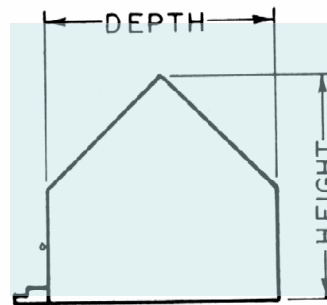
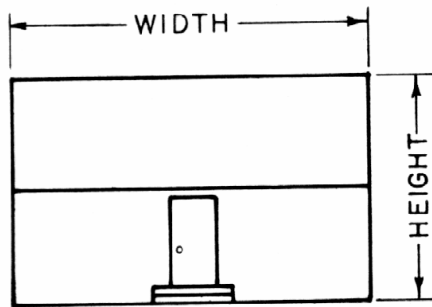
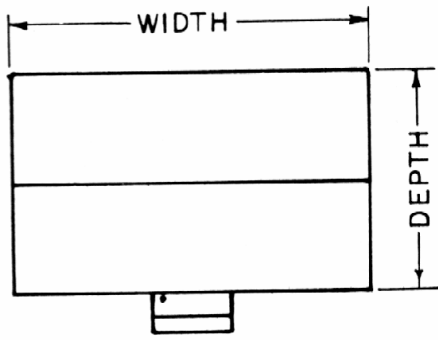
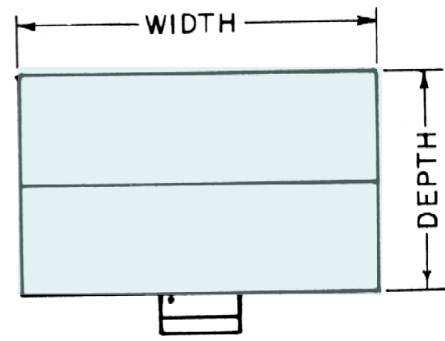


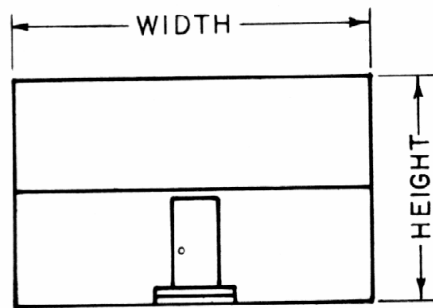
Fig. 4.8 Dimensions shown in each view

Source : Cook (1985)

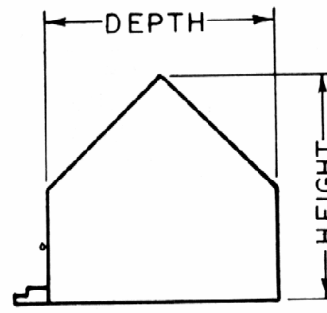




TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

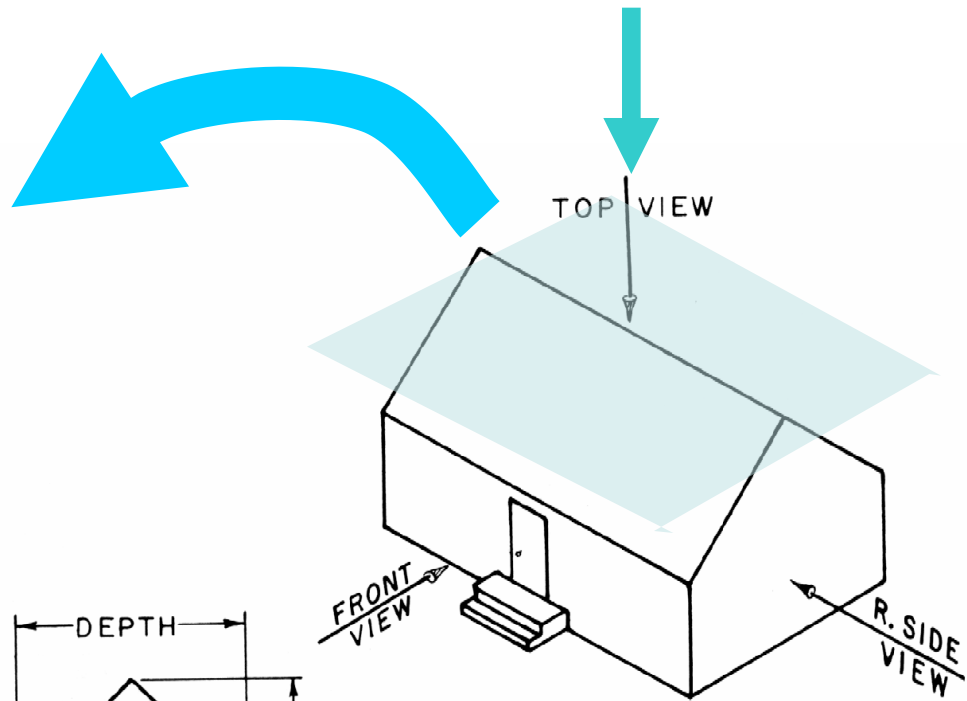
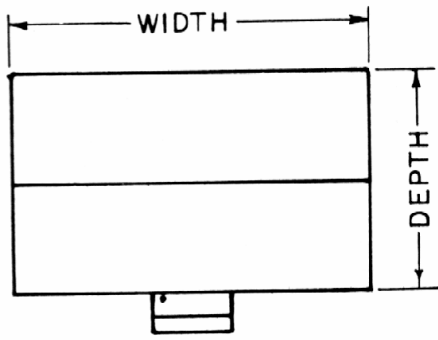
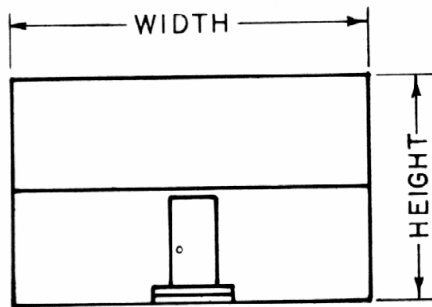


Fig. 4.8 Dimensions shown in each view

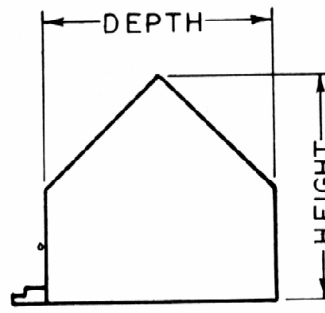
Source : Cook (1985)



TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

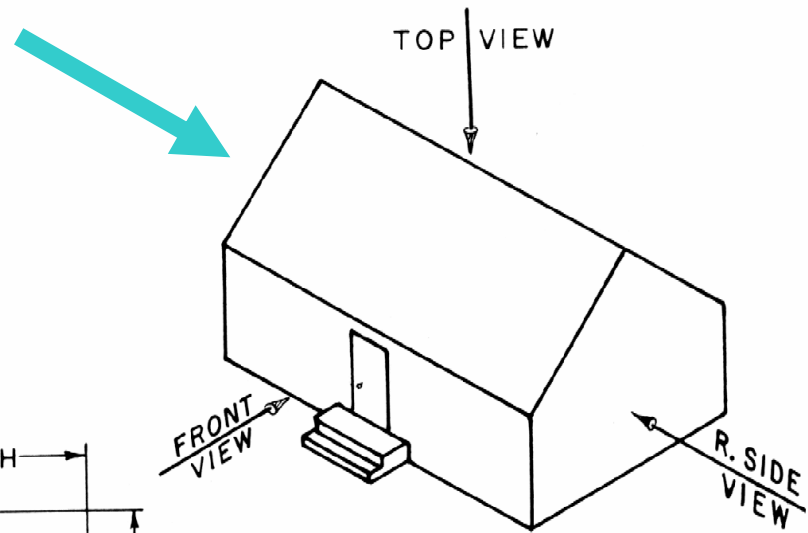


Fig. 4.8 Dimensions shown in each view

**Where do we place the left side view?**

Source : Cook (1985)

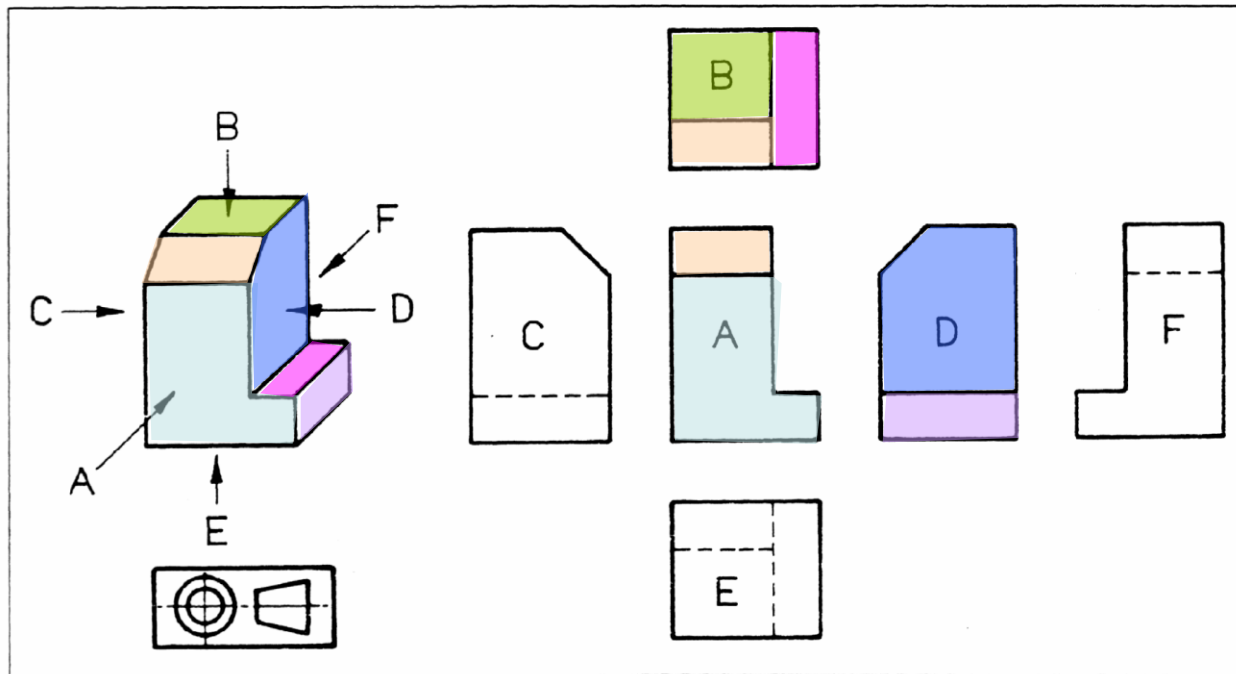


FIGURE 1.5 ORTHOGONAL (THIRD ANGLE) PROJECTION  
WITH PROJECTION SYMBOL

Source : SAA (1994)

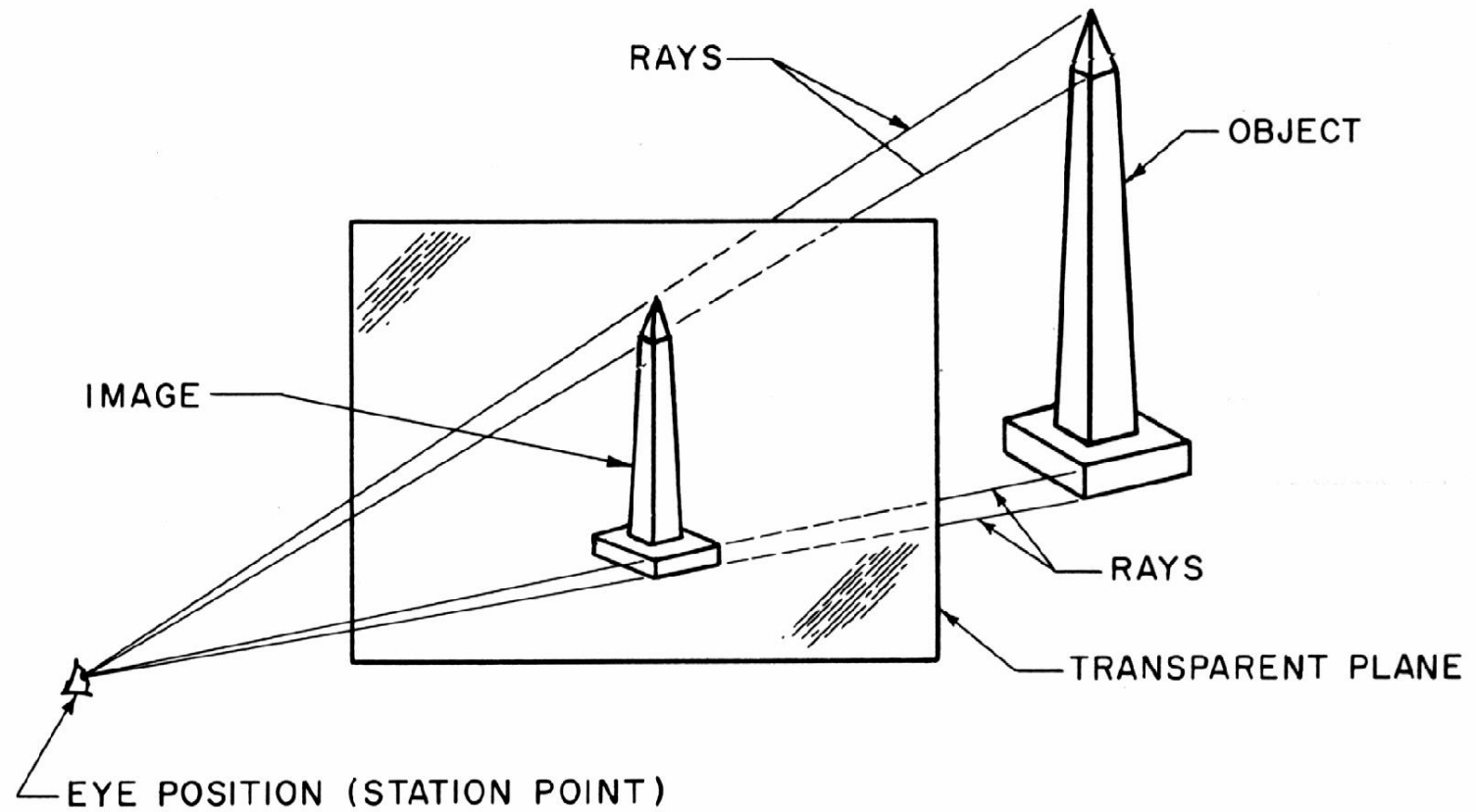
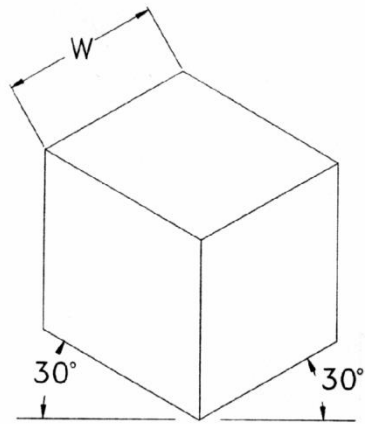
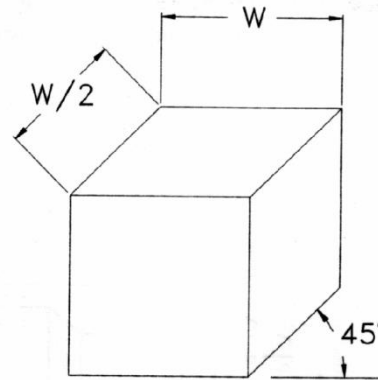
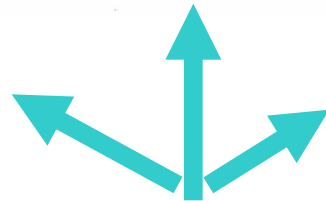


Fig. 4.3 Perspective projection

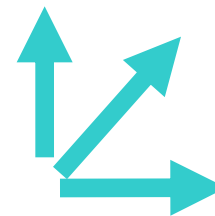
Source : Cook (1985)



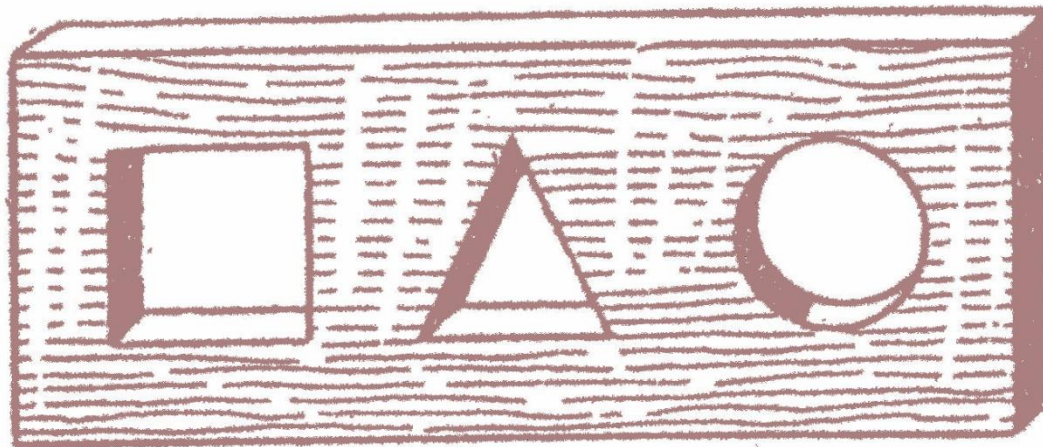
ISOMETRIC



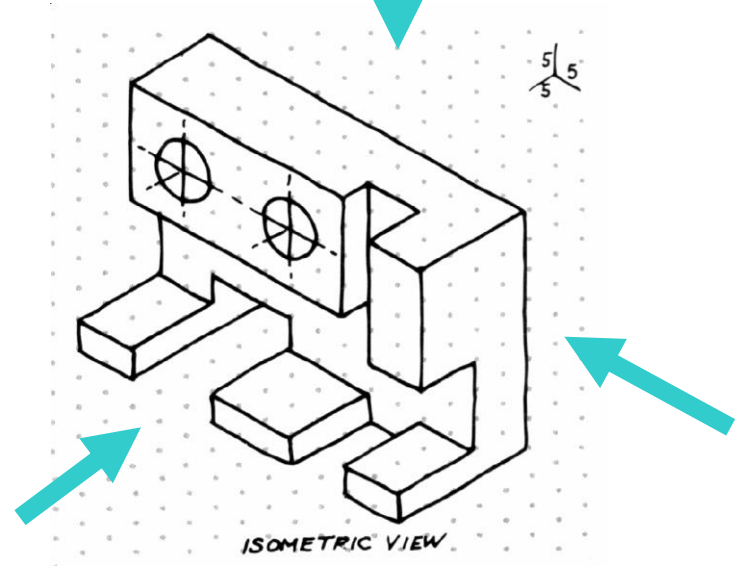
OBLIQUE



Source : Tully (1995)

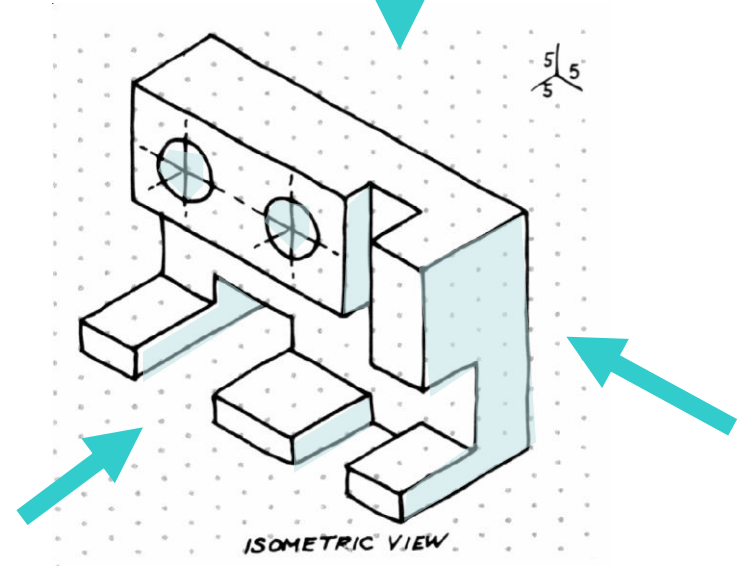
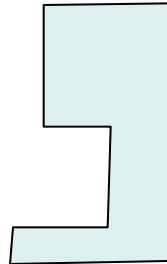


# Sketch orthogonal projections



Source : A.W. Boundy (2002)

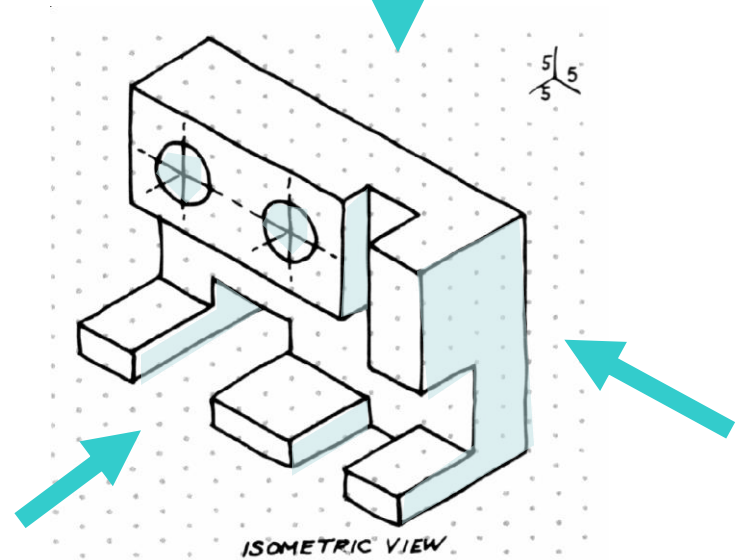
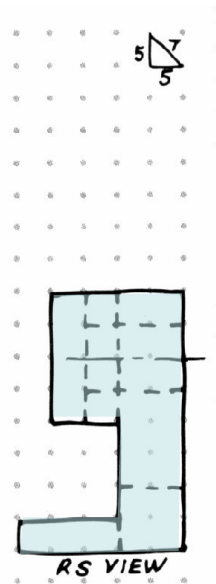
# Sketch orthogonal projections



Source : A.W. Boundy (2002)

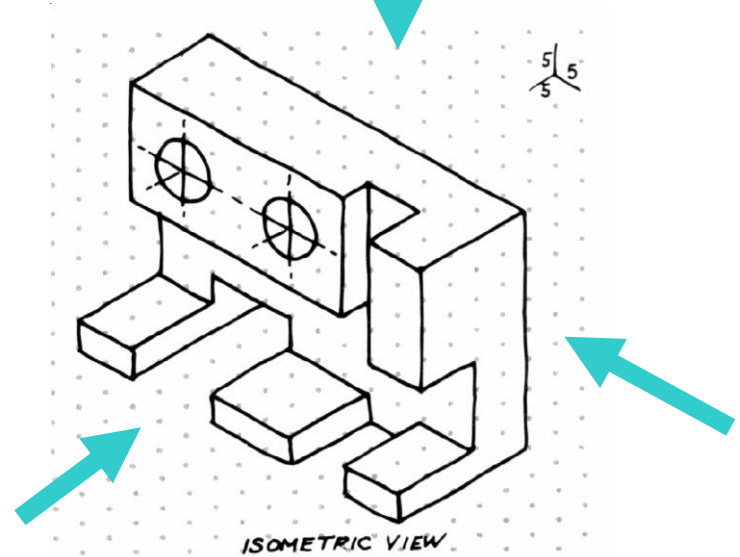
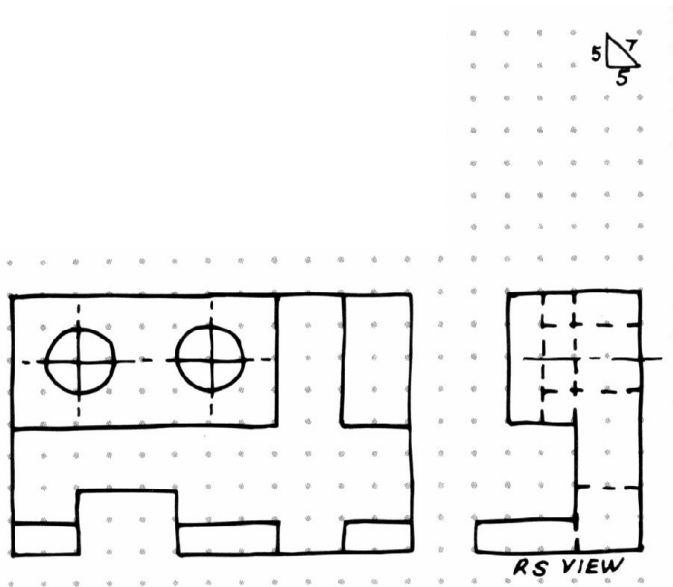


# Sketch orthogonal projections



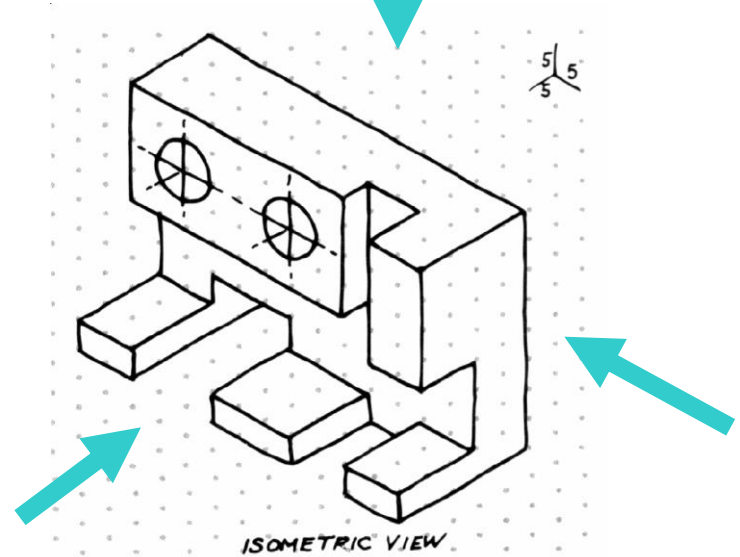
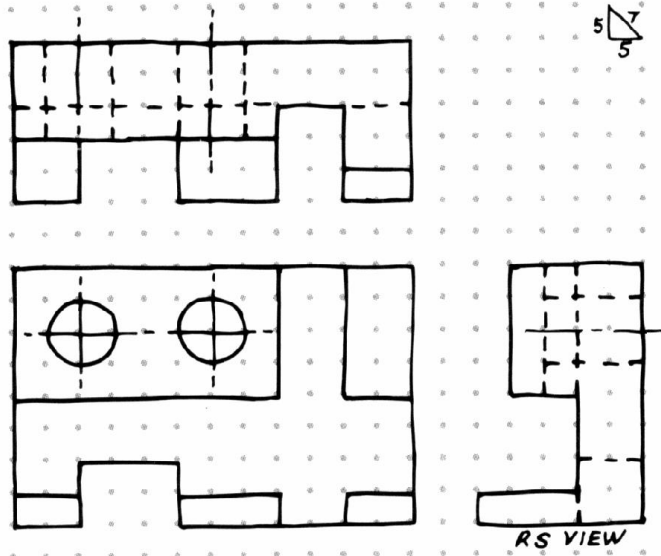
Source : A.W. Boundy (2002)

# Sketch orthogonal projections



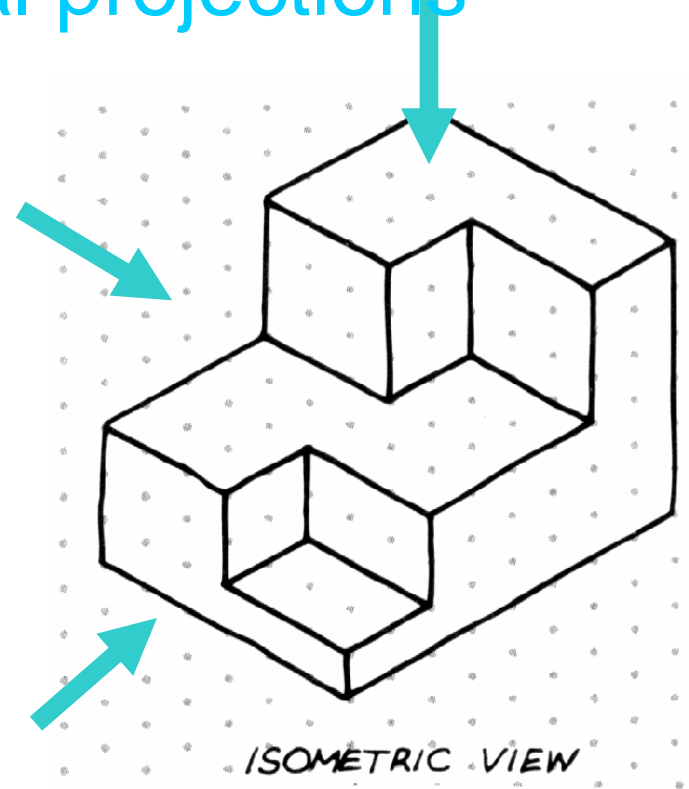
Source : A.W. Boundy (2002)

# Sketch orthogonal projections

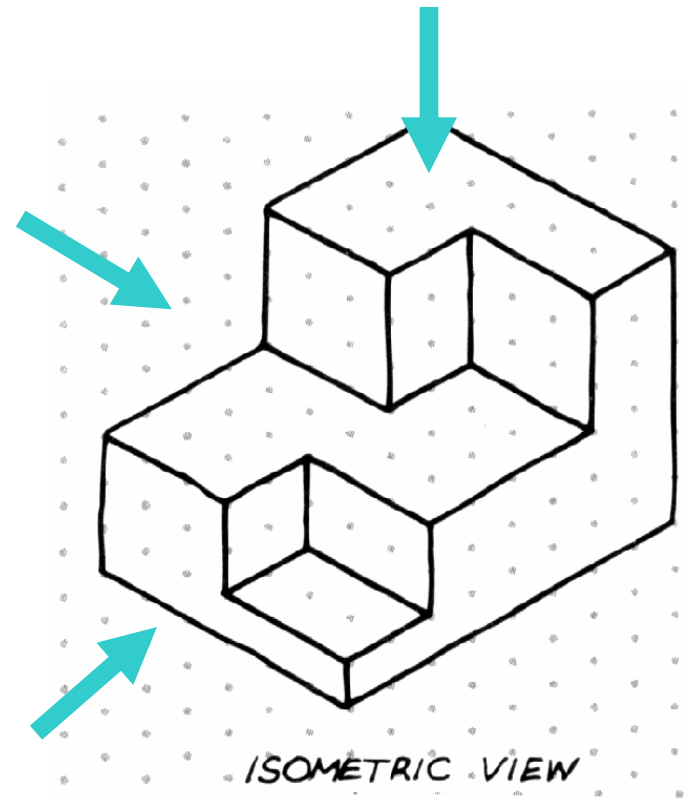
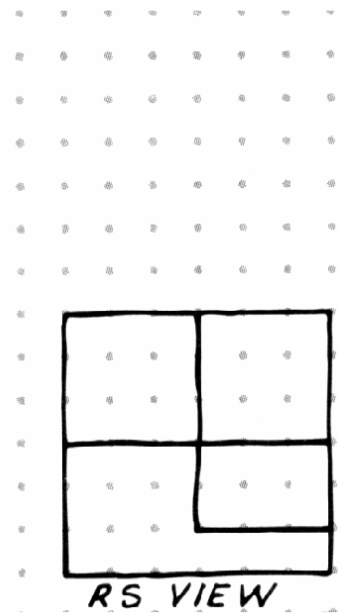


Source : A.W. Boundy (2002)

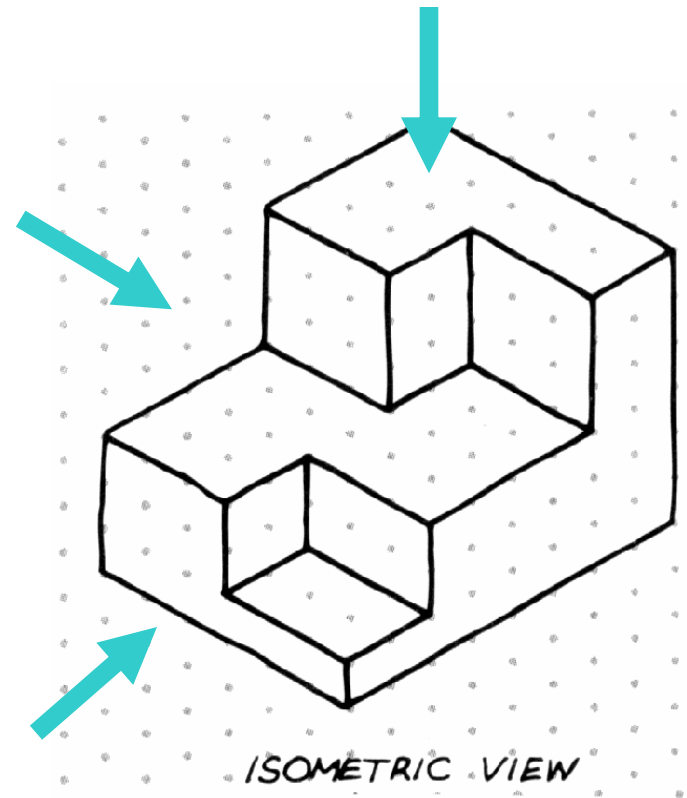
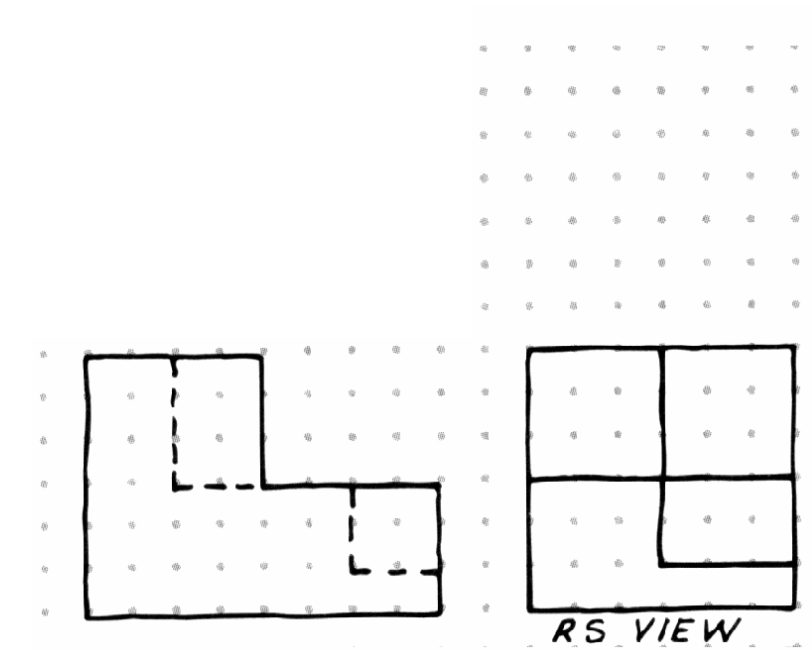
# Sketch orthogonal projections



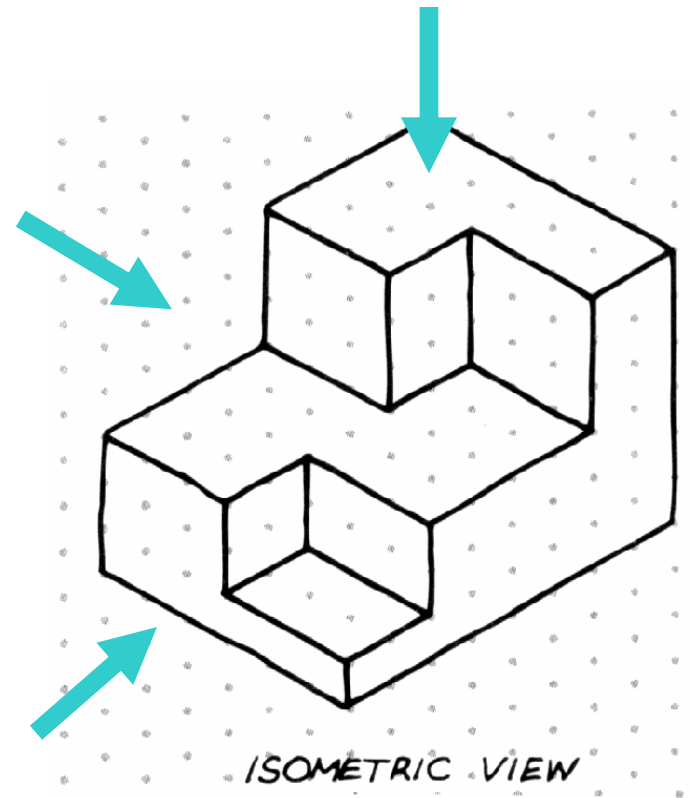
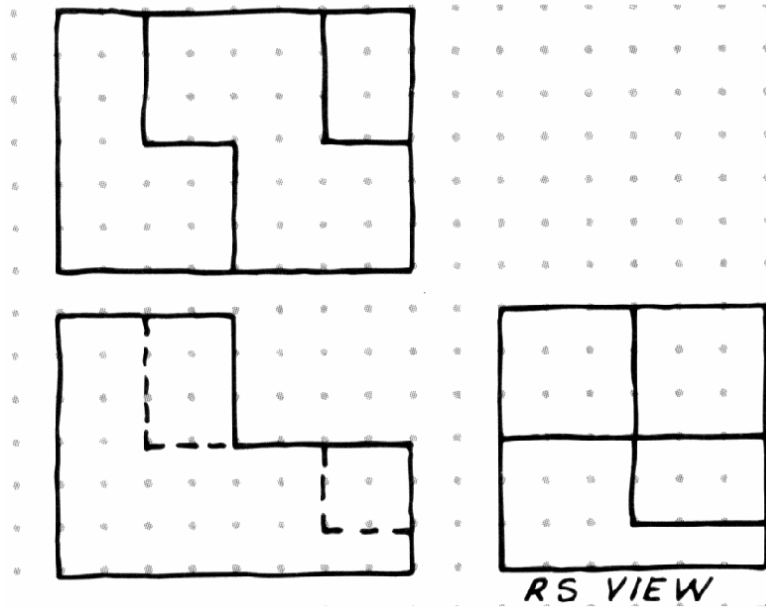
Source : A.W. Boundy (2002)



Source : A.W. Boundy (2002)



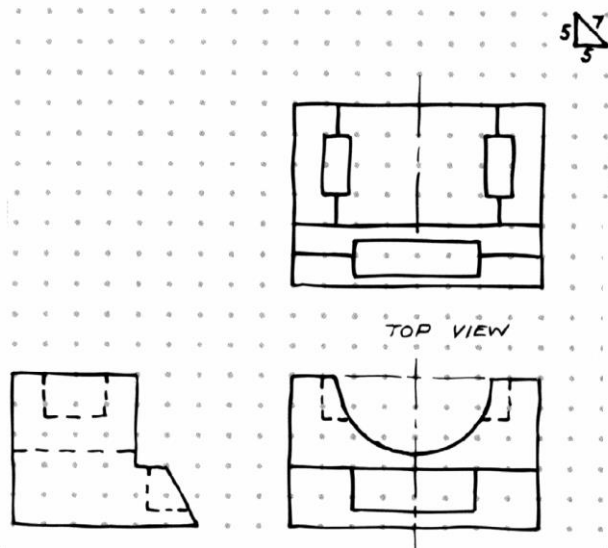
Source : A.W. Boundy (2002)



Source : A.W. Boundy (2002)

# Homework

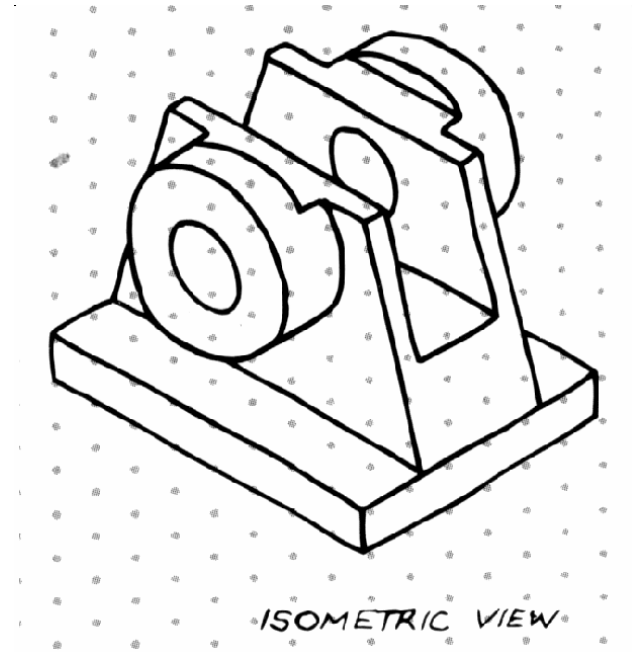
## Sketch isometric view

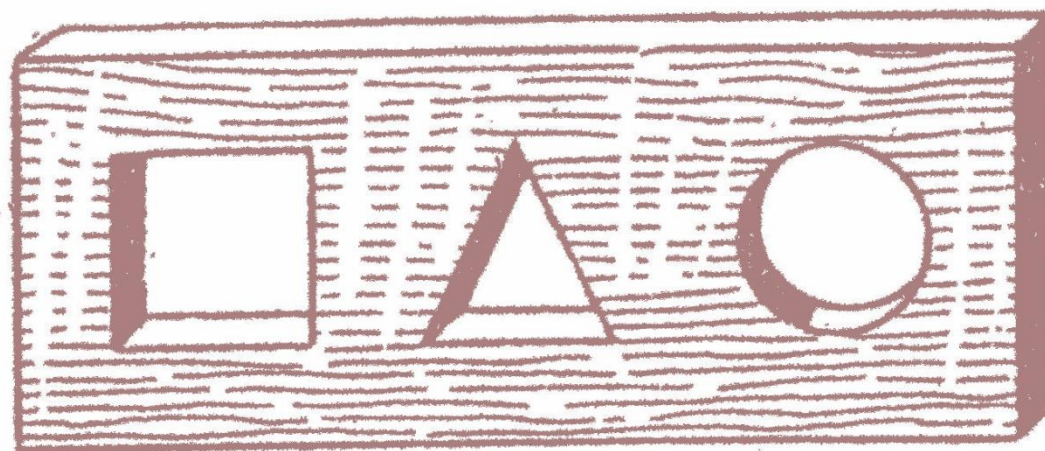











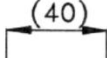

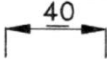
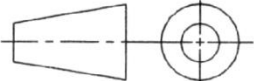
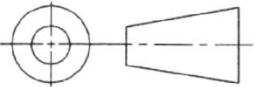
# Homework

## Sketch 3<sup>rd</sup> angle projection











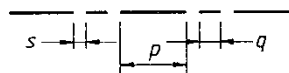





**Table 7.1** Common symbols used on drawings

SYMBOL	DESCRIPTION	EXAMPLE
$\varnothing$	THIS SYMBOL IS USED TO INDICATE THE DIAMETER OF A CIRCLE, CYLINDER OR SPHERE.	$\varnothing 50$
R	THIS SYMBOL IS USED TO INDICATE A RADIUS OF PART OF A CIRCLE, CYLINDER OR SPHERE	R 30.0
	THIS SYMBOL IS USED TO INDICATE A SQUARE SECTION WHERE THE DIMENSION IS THE DISTANCE ACROSS THE FLATS.	 75.0
	THIS SYMBOL IS USED TO INDICATE A TAPER AND ITS DIRECTION. THE CENTRE LINES OF THE SYMBOL MUST BE PARALLEL TO THE AXIS OF SYMMETRY OF THE TAPER.	 3 : 100
	THIS SYMBOL IS USED TO INDICATE A SLOPE AND ITS DIRECTION. THE BASE OF THE SYMBOL MUST BE PARALLEL TO THE DATUM PLANE.	 1 : 10
	THIS SYMBOL IS USED TO INDICATE A REFERENCE OR AUXILIARY DIMENSION.	
	THIS SYMBOL IS USED TO INDICATE A DIMENSION WHICH IS NOT DRAWN TO SCALE.	
	FIRST-ANGLE PROJECTION	ONE OF THESE SYMBOLS SHOULD APPEAR ON ALL ENGINEERING DRAWINGS. THEY ARE USED TO INDICATE WHICH OF THE PROJECTION SYSTEMS IS BEING USED FOR THAT PARTICULAR DRAWING.
	THIRD-ANGLE PROJECTION	

*Note:* The first five symbols shown on this table should be placed in front of the dimension. Datum plane is a flat surface used for establishing a reference from which the slope of a line or feature is taken.

Source : Tully (1995)

1	2	3	4
Designating letter	Type of line	Example of line	Typical application
A	Continuous—thick		Visible outlines General details Existing buildings Landscaping in site plans Busbars and transmission paths
M	Continuous—medium		See Note 1
B	Continuous—thin		Fictitious outlines Imaginary intersection of surfaces Dimension lines, projection lines, intersection lines and leaders Hatching and outlines of revolved sections Fold and tangent bend lines Short centre-lines General purpose electrical conductors and symbols
C	Continuous—thin, free-hand		Break lines (other than on an axis)
D	Continuous—thin, ruled with zig-zag		Break lines (other than on an axis)
E	Dashed—thick (see Note 2)		Hidden outlines Hidden edges
N	Dashed—medium (see Note 2)		See Note 1
F	Dashed—thin (see Note 2)	 $s = 1 \text{ mm MINIMUM}$ $q = 2s \text{ to } 4s$	Hidden outlines Jumper connections magnetic or electric screen
G	Chain—thin	 $s = 1 \text{ mm MINIMUM}$ $q = 2s \text{ to } 4s$ $p = 3q \text{ to } 10q$	Centre-lines and axes of solid Pitch lines Path lines for indicating movement Features in front of a cutting plane Indication of repeated detail Developed views Material to be removed
H	Chain—thick at ends and at change of direction—thin elsewhere	 See Note 3	Cutting planes
J	Chain—thick	 See Note 3	Indications of surfaces to comply with special requirements Pipelines, drains, services
K	Chain—thin, double dashed	 See Note 3	Outlines of adjacent parts Alternative and extreme position of movable parts Centroidal lines Tooling

Clear version of this table is in your notes on Engineering Drawing

# Hands on tasks

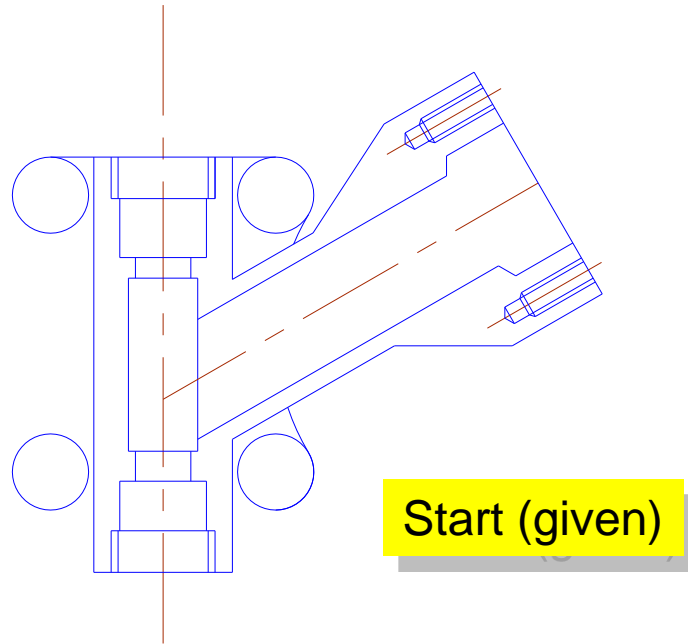
- CAD files required for hands on work:  
[Moodle](#)
- Computer lab: Room 611 – Civil and Environmental Engineering Building (H20)

# Object snaps

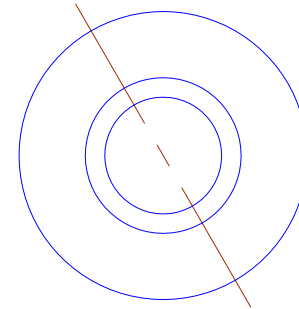
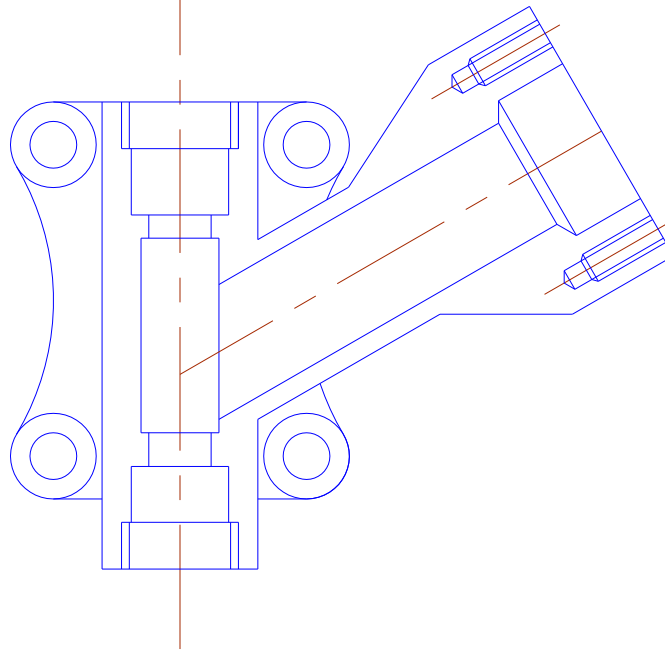
- Provides something akin to imaginary guide lines
- Allows using already constructed drawing elements as a guide for new elements
- Allows joining lines without leaving gaps
- Ensures consistency and dimensional accuracy of different parts of diagrams

# Task 1: Object snaps

- Chapter 2.II (Pages 1-6)



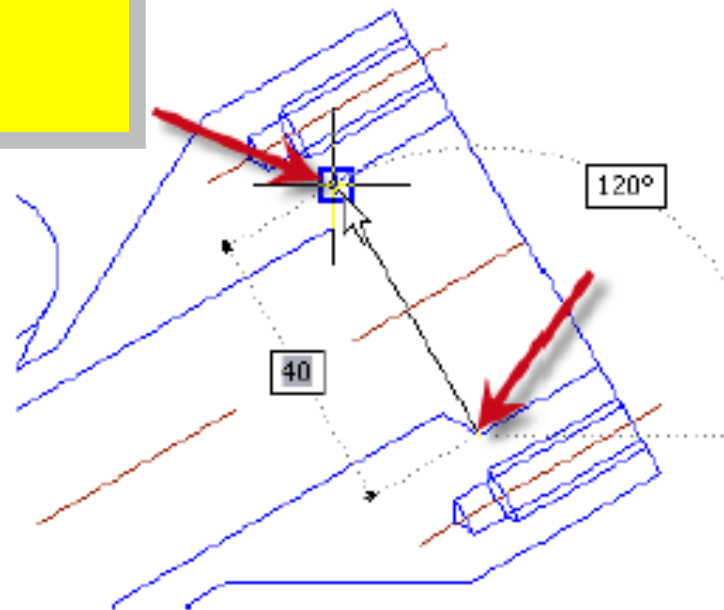
1. Complete the diagram



2. Draw this view looking in towards the hole



Watch for this snap marker to join your first line to the existing object corner



# Submit this task

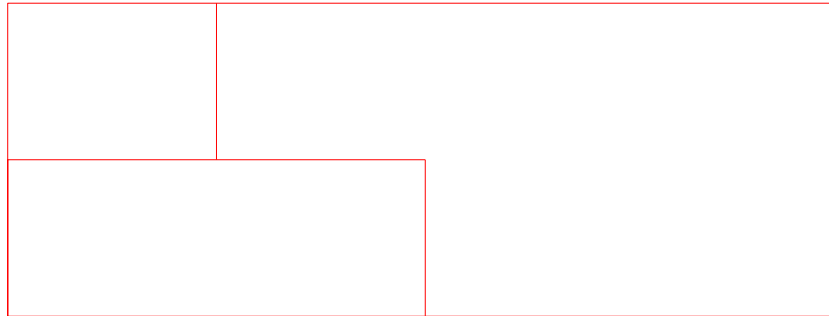
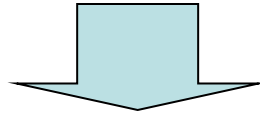
- Use assignment tool in [Moodle](#) to upload the file you have created at the end of this task.
- Individual submission required
- Value 1 mark
- Submit this week (before Friday, 14 April 2017, 6:00 PM)
- Only first exercise on (pages 1-4):

***Week 7 - Activity 5 Trim extend offset.pdf***

# ‘Objects’

- End points
- Corners
- Mid points
- Centres (of circles, arcs)
- .....

# Preparing a house plan

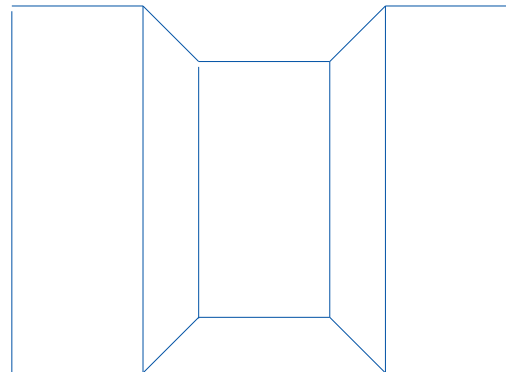


## Task 2: 'Tracking'

- Move relative a track point (object)
- Ensures precision (not eye-estimation)
- Digital entry possible when exact values known
- Cursor click acceptable when arbitrary position along the 'track' is required
- 'ortho' and 'polar' options

# Polar tracking

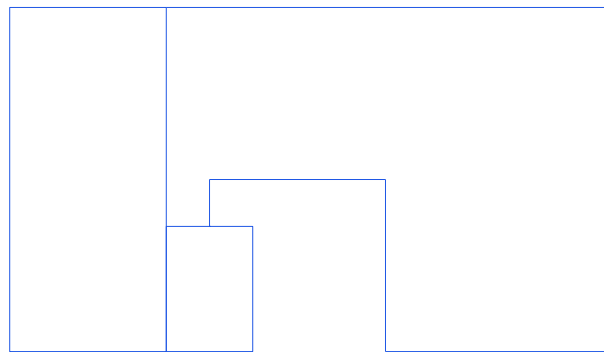
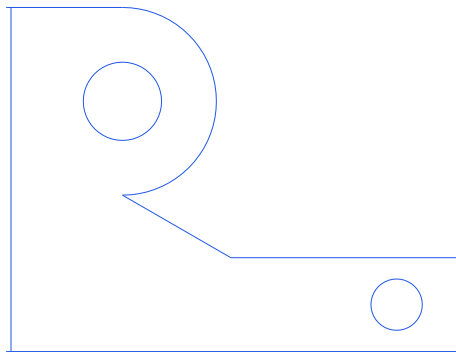
- Chapter 2.II, Pages 6 - 11
- Precise distances and angles handled by digital input



Final diagram

# Task 3: Object snap tracking

- Chapter 2.II, Pages 12 - 15
- Create the side view shown on the right hand of this picture (using left hand side diagram as a guide)



Final diagram

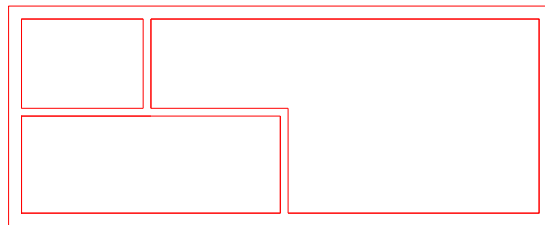
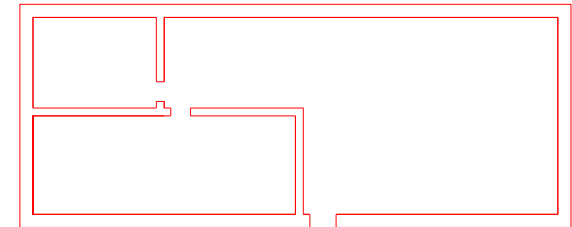
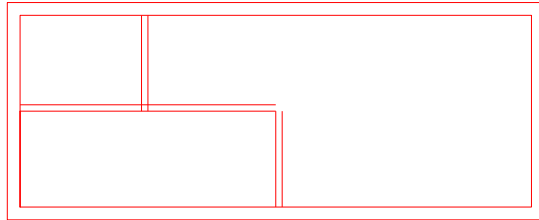
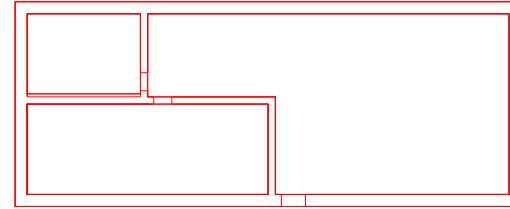
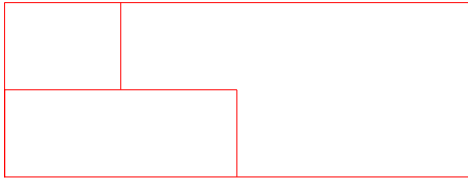
# Task 4:

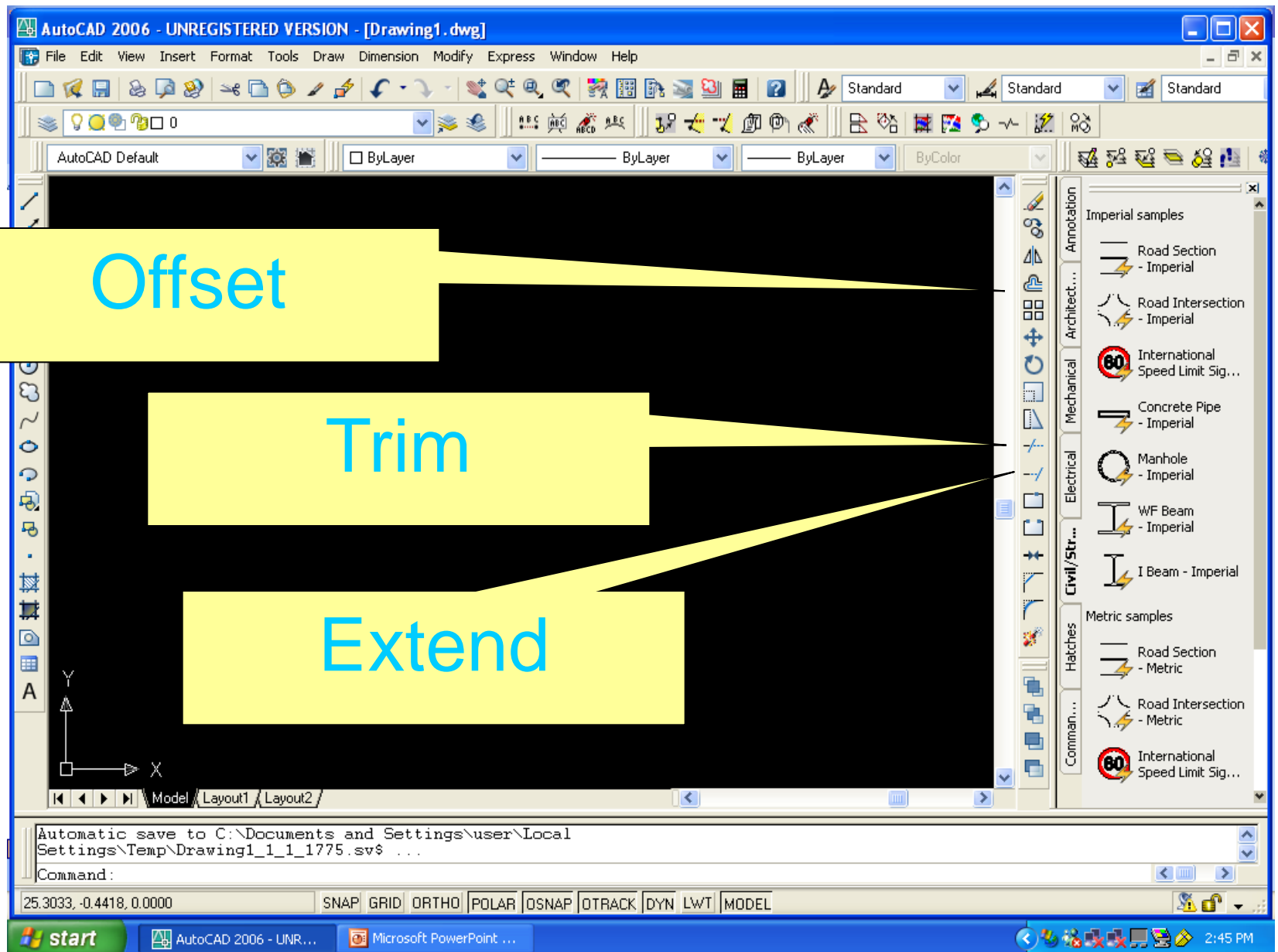
## Remove part of line or curve

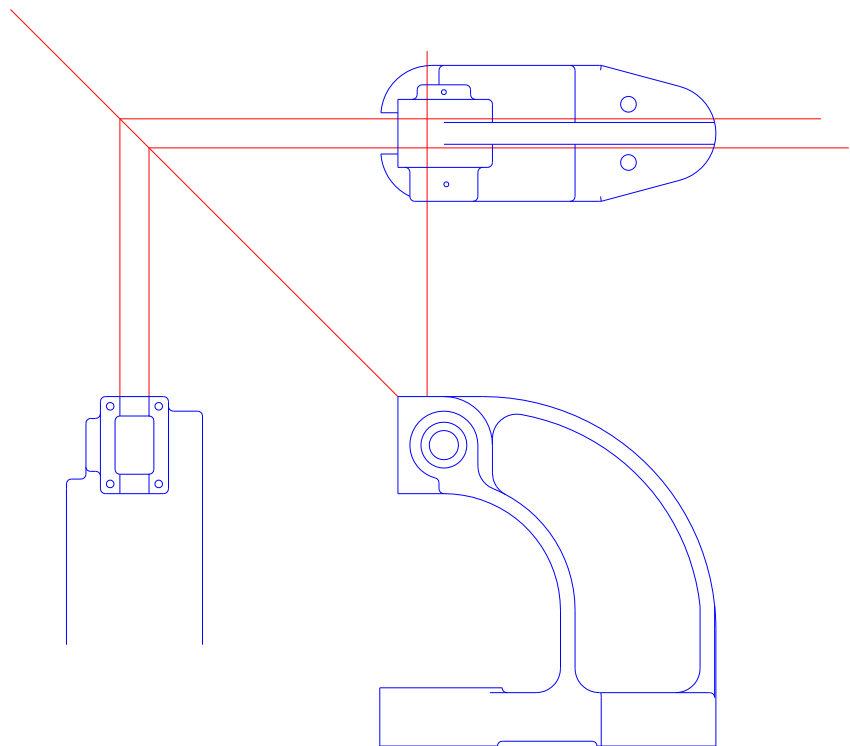
- As a first step in creating door and window openings in the house layout
- To draw a hole in a solid object
- Use 'trim'
- Task in chapter 3.II, pages 1-4
- Use 'extend' to draw continuations of lines



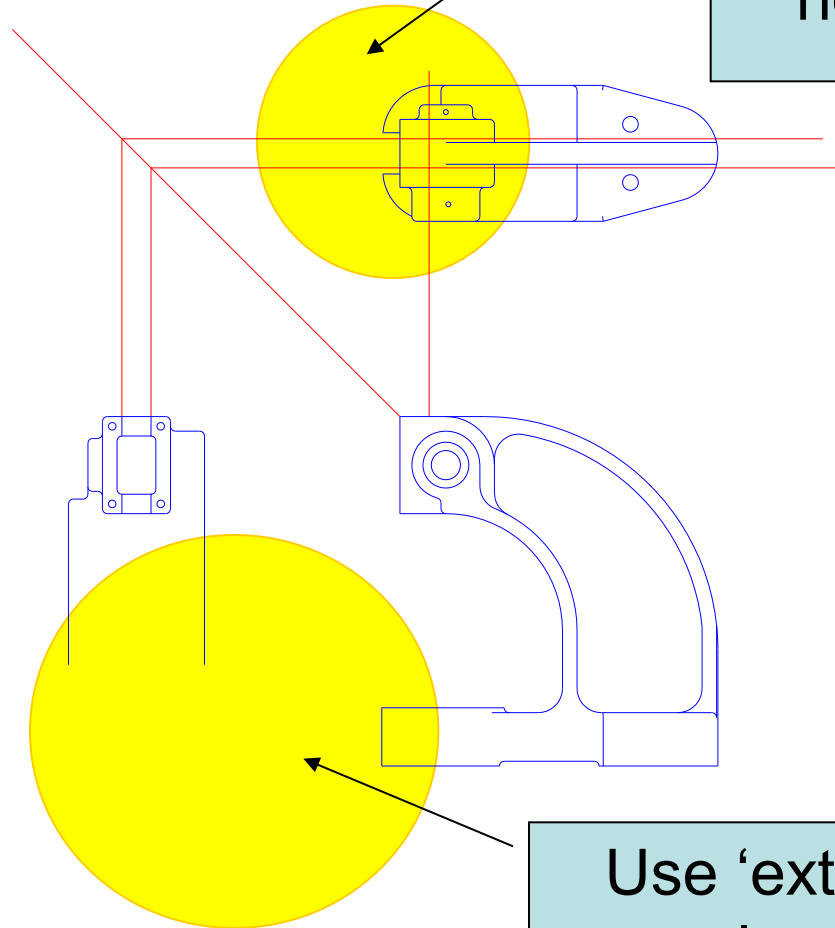
# Preparing a house plan





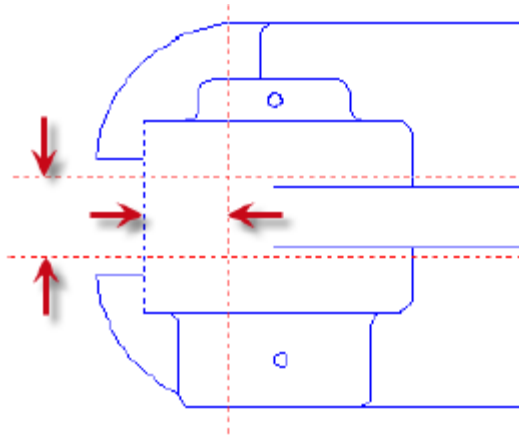


Use 'trim' here  
to complete the  
hole shape

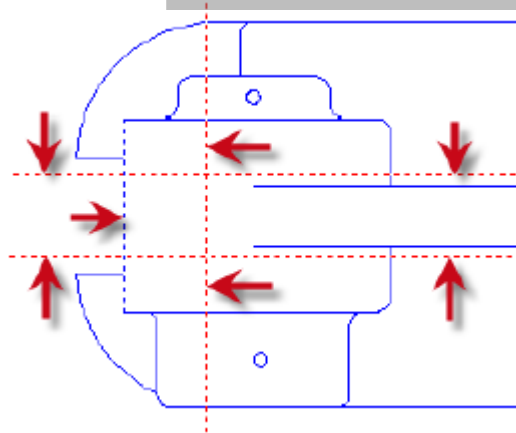


Use 'extend' here to  
complete the diagram

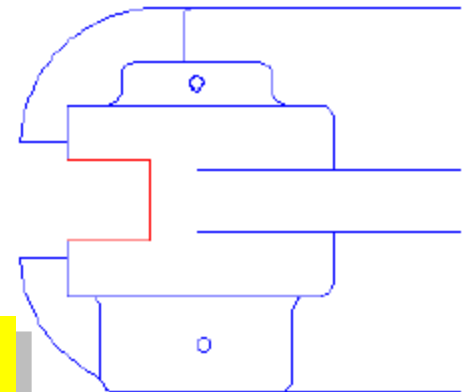
**Trim** <identify lines to use as boundary edges> <Return>



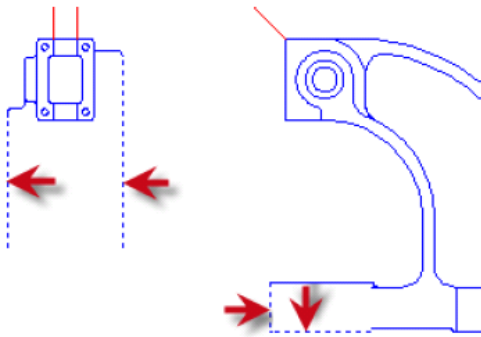
<identify segments to erase> <Return>



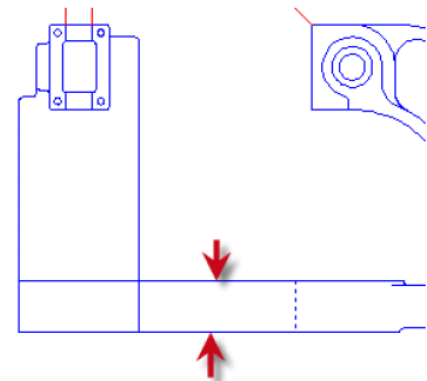
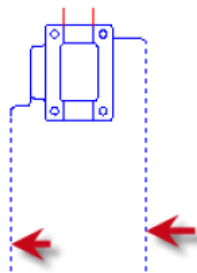
**Result**



**Extend** <identify lines to use as boundary edges> <Return>



<identify lines to extend> <Return>



**Result**

# Task 5:

## Parallel lines and curves

- Use 'offset'
- Task in chapter 3.11, pages 4-9
- Pattern: Offset, separation distance, original object, select a side

# Useful options

- Through: draw the parallel through a point of another object
- Erase: Draw the parallel and erase the original – like a shift function
- Layer: the parallel is in a different layer
- Multiple: Draw a series of parallel lines



# Summary

- Third angle projection
- Hidden lines
- Accuracy and speed through snaps and tracking
- Hands on tasks:
  - Create holes and openings
  - Extend lines
  - Draw parallels
  - Submit CAD Task using Moodle assignment submission before the end of the week (Friday, 6pm)
- Homework
  - Isometric view of selected objects
  - sketch third angle projection of your project object

# Important

- Check your marks on April 24 for Week 7 Activity
- Next lectures: April 24 and May 1

