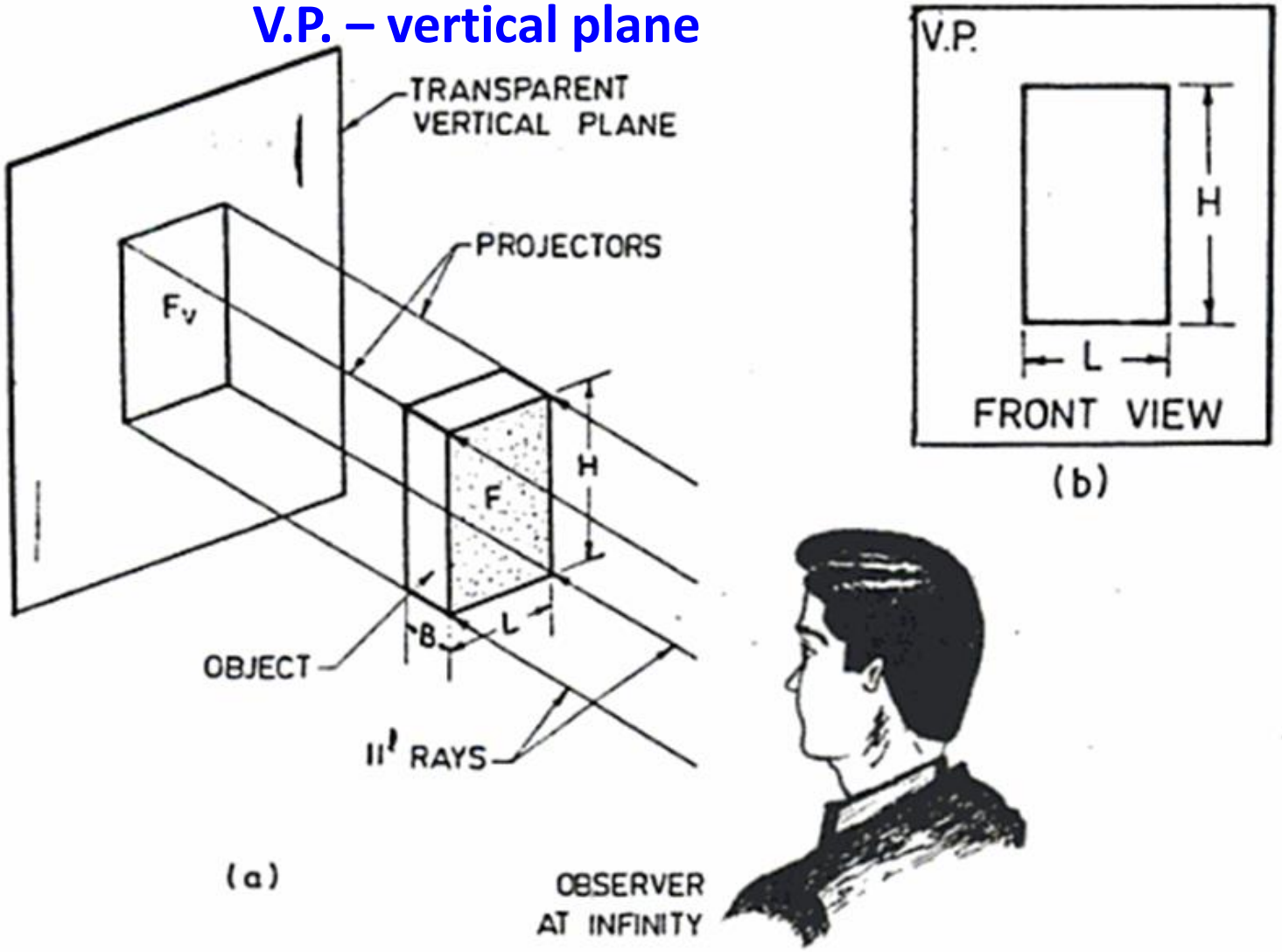
ORTHOGRAPHIC PROJECTIONS

Ortho – right angle

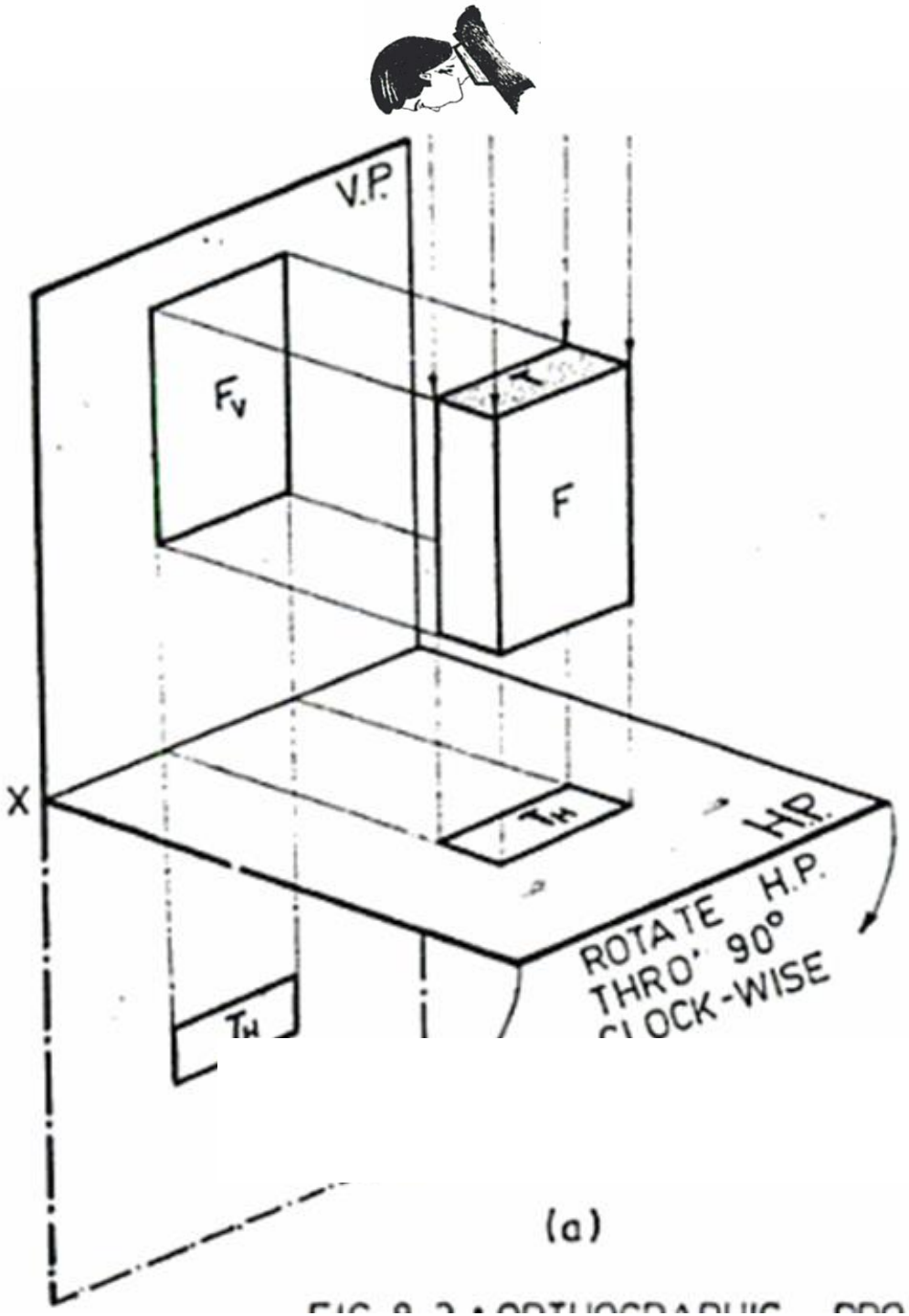
Orthographic – right angled drawing

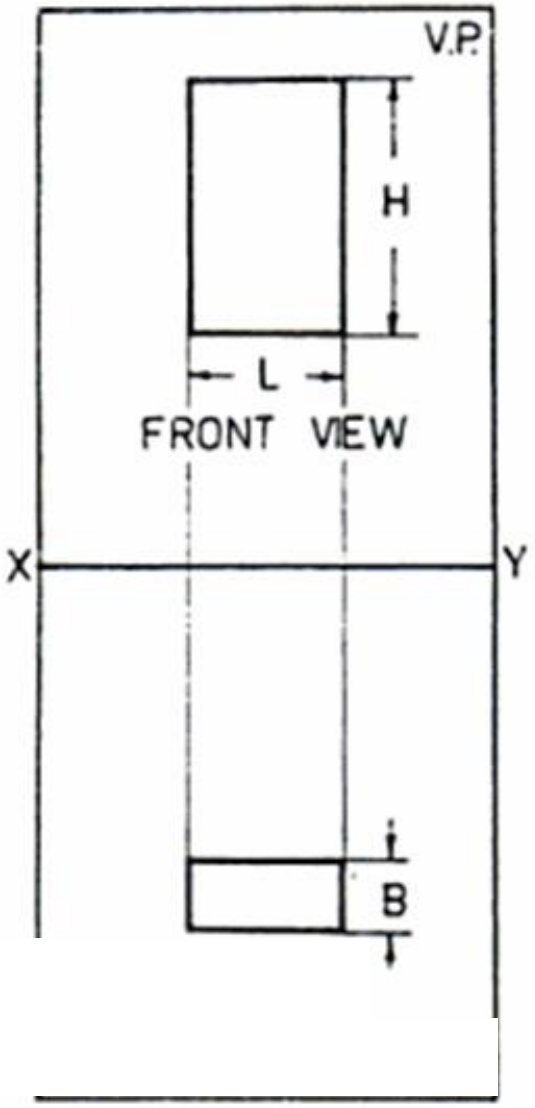
When the projectors are perpendicular to the plane on which the projection is obtained, it is known as orthographic projection

V.P. – vertical plane



FIRST ANGLE PROJECTION – FIRST QUADRANT





V.P – Vertical Plane

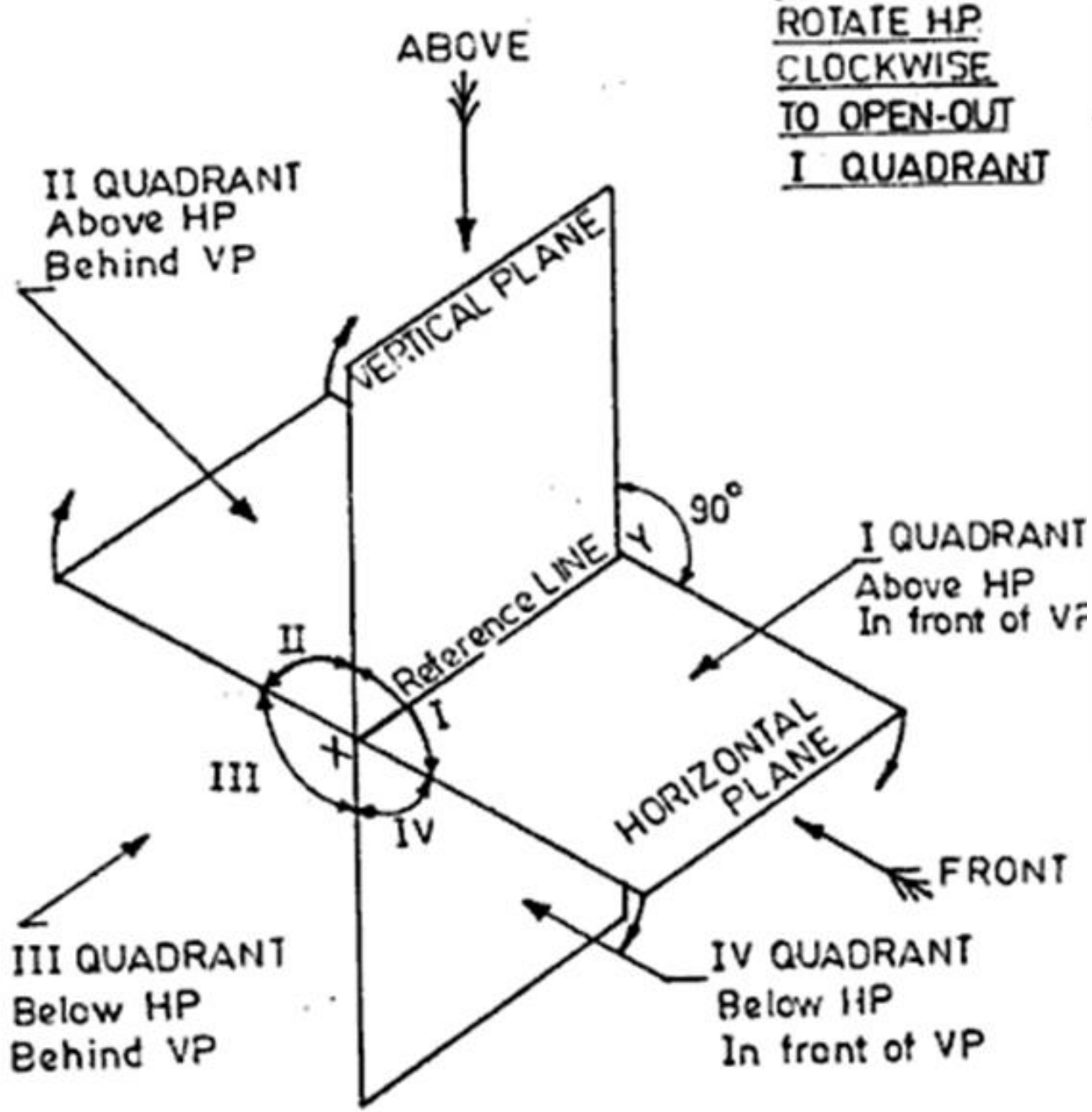
H.P – Horizontal Plane

V.P. and H .P – Principal planes of projection

Projection on VP – FRONT VIEW

Projection on HP – TOP VIEW

FOUR QUADRANTS -



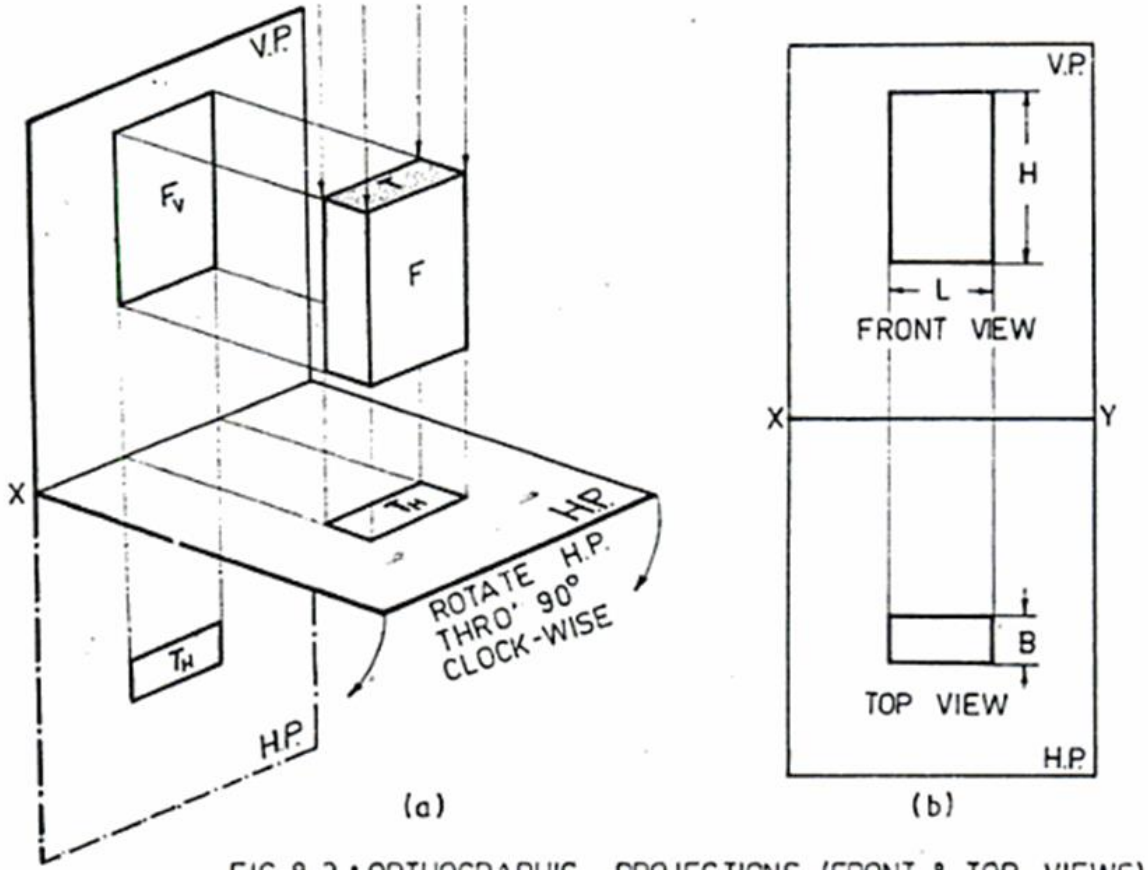
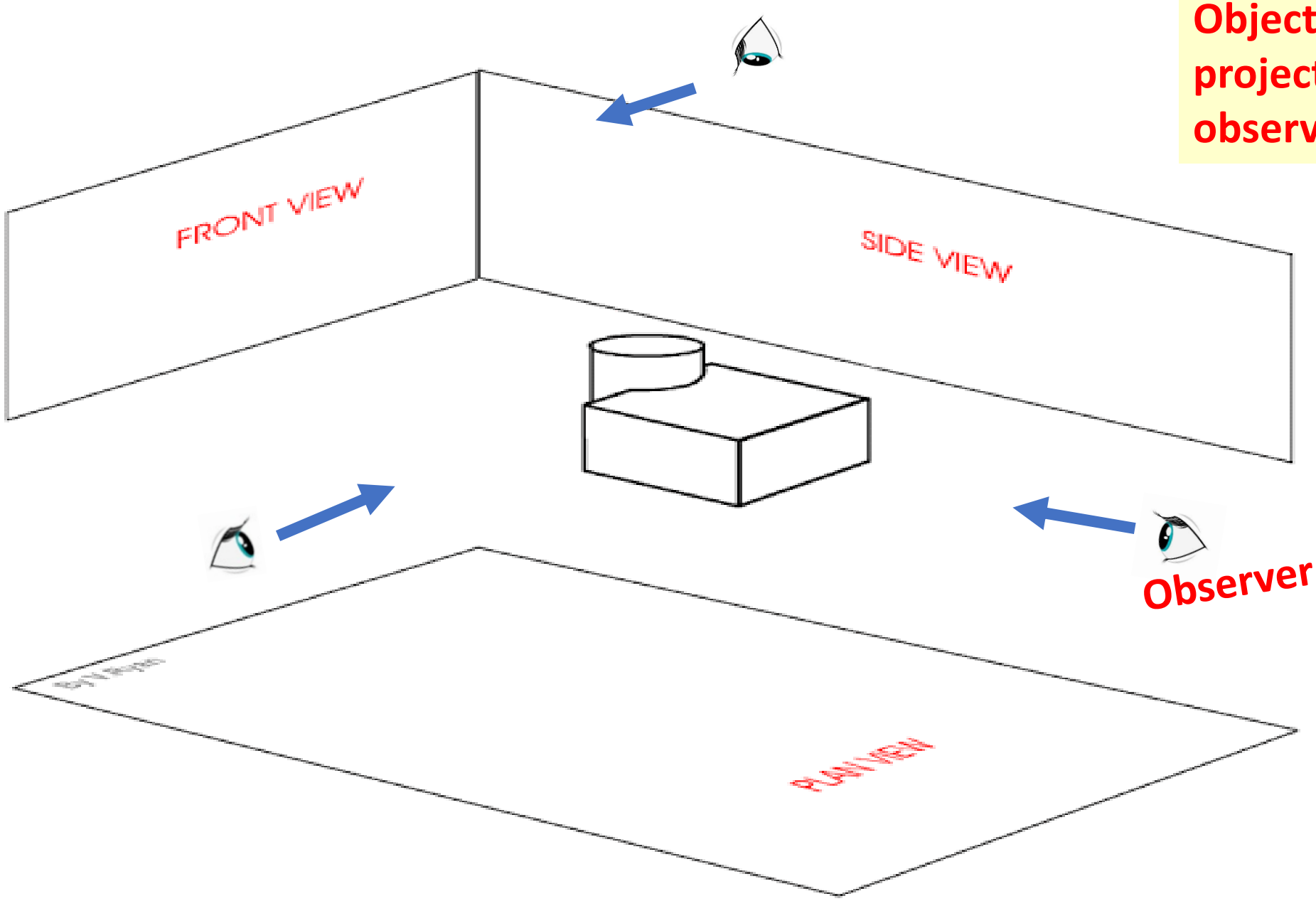


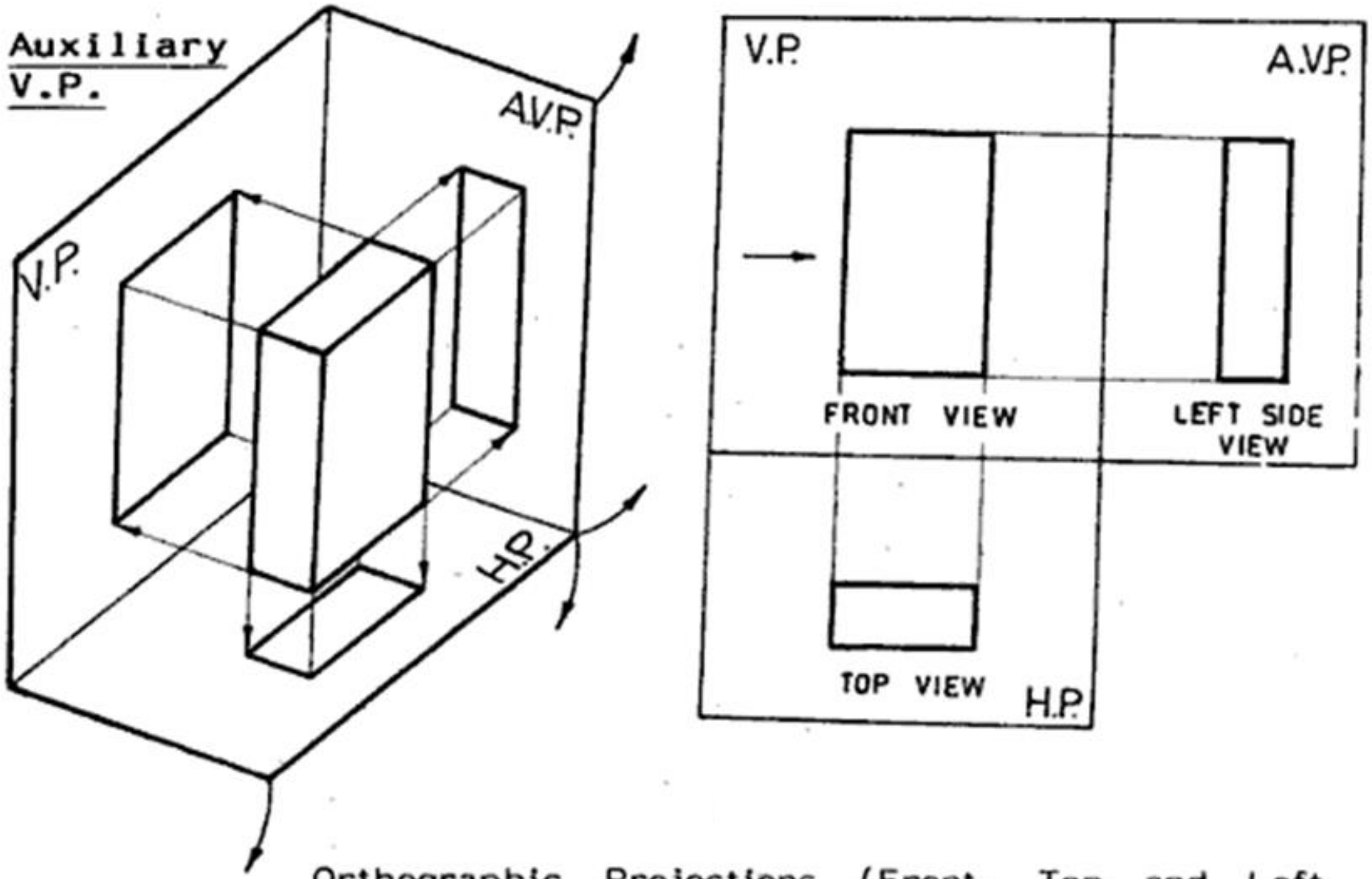
FIG. 8.2 ORTHOGRAPHIC PROJECTIONS (FRONT & TOP VIEWS)

OBJECT IS INBETWEEN THE OBSERVER AND THE PROJECTION PLANE

FIRST ANGLE PROJECTION

Object lies between projection plane and observer





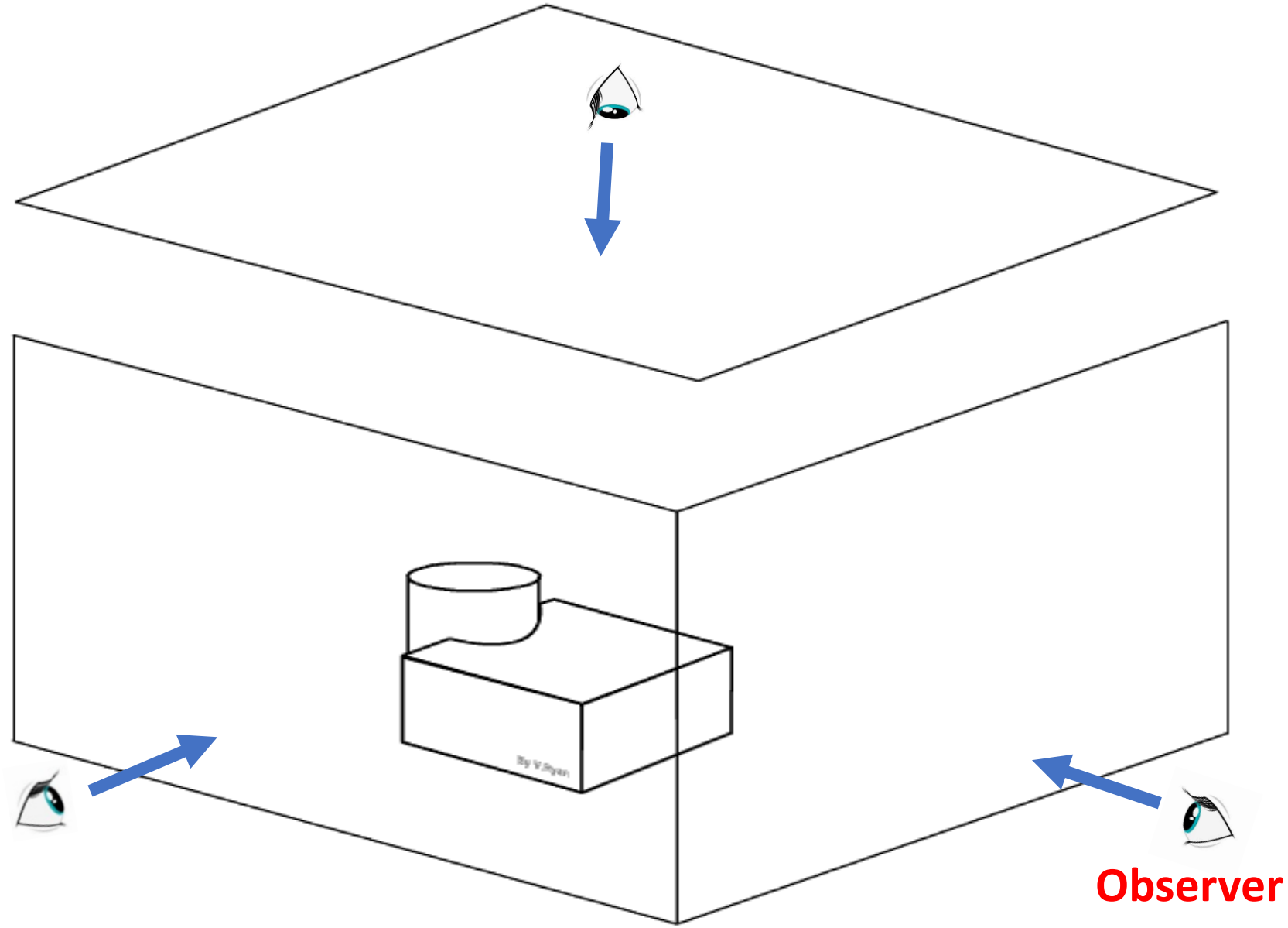
Orthographic Projections (Front, Top and Left side views)

AVP is positioned on the right side of the VP to obtain the left side view

AVP is positioned on the left side of the VP to obtain the right side view

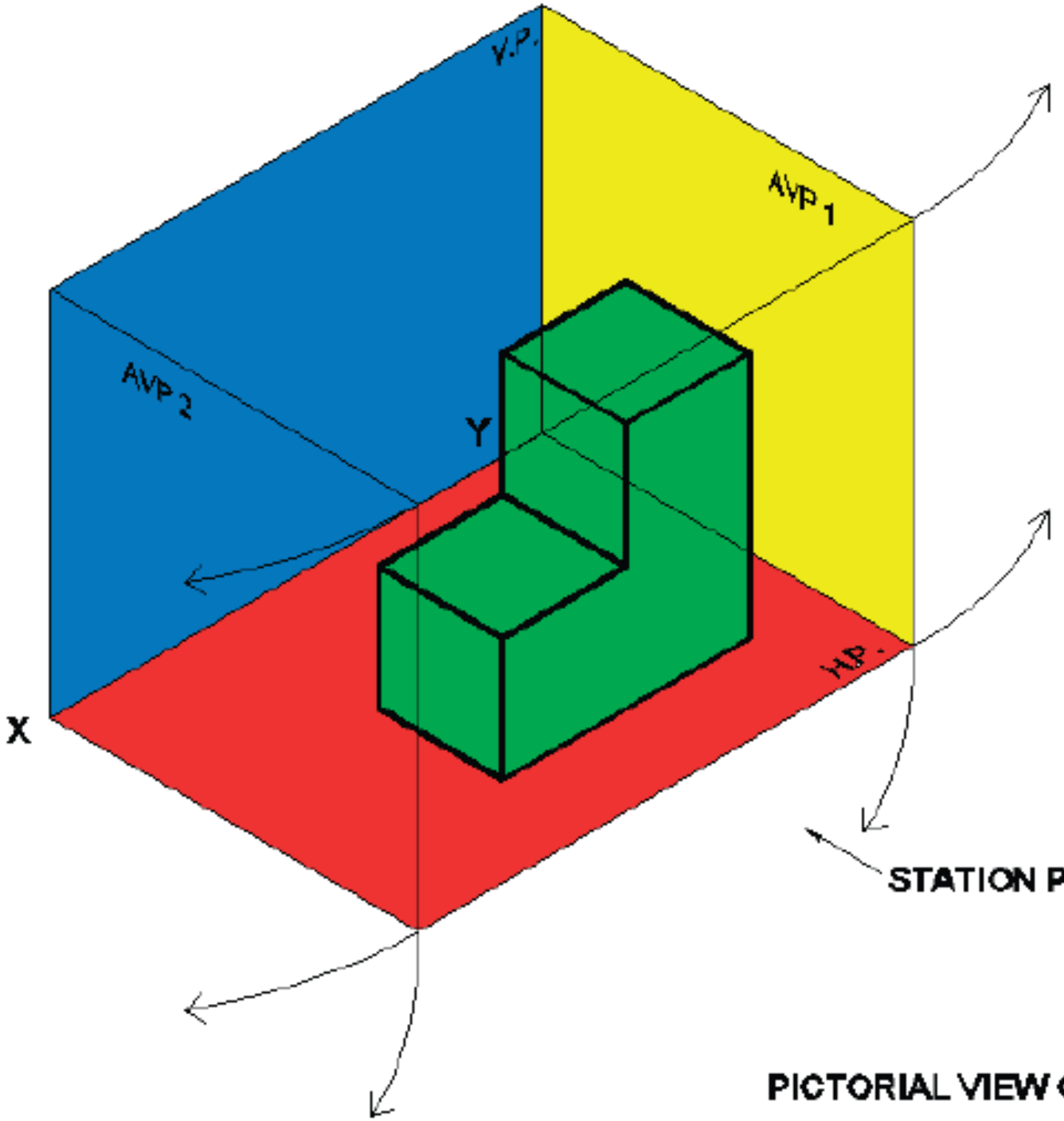
THIRD ANGLE PROJECTION

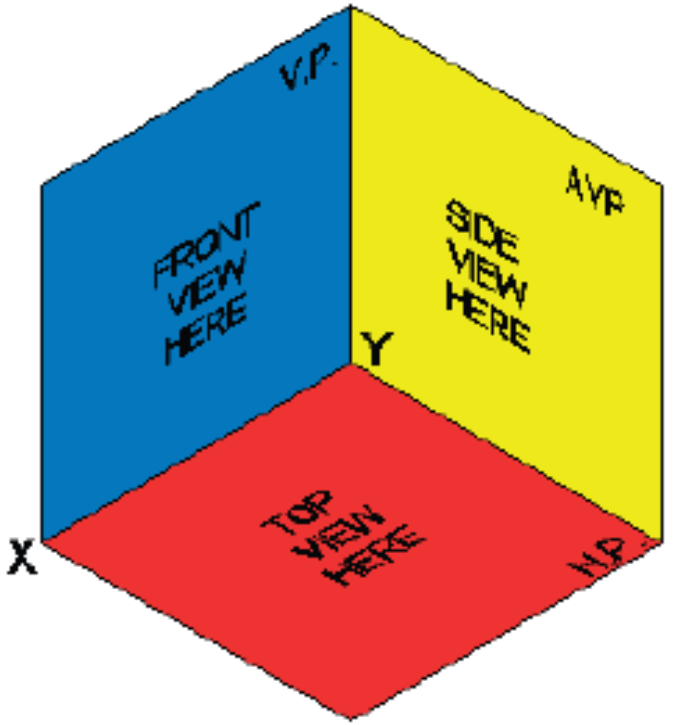
Projection plane lies between object and observer



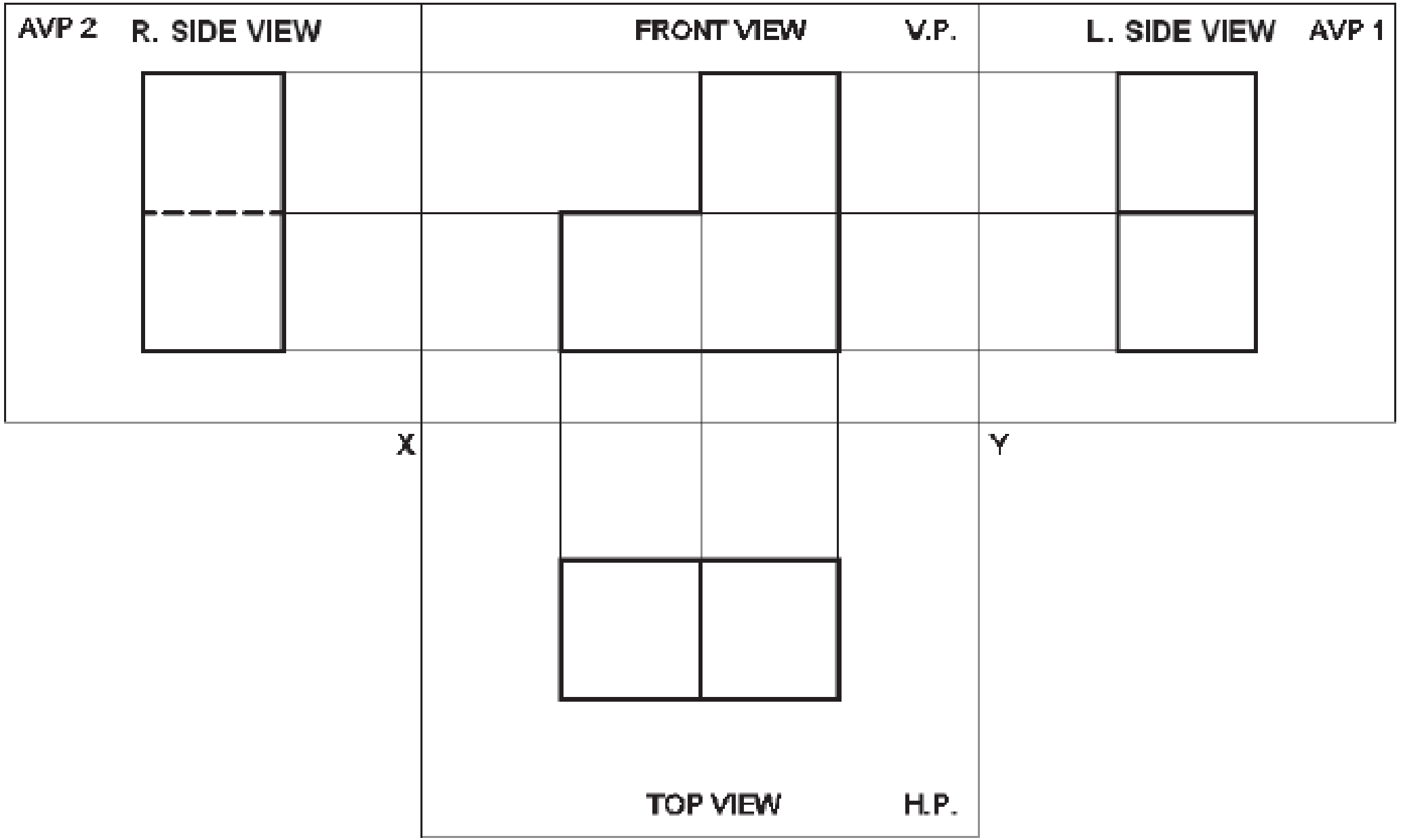
Observer

FIRST ANGLE PROJECTION





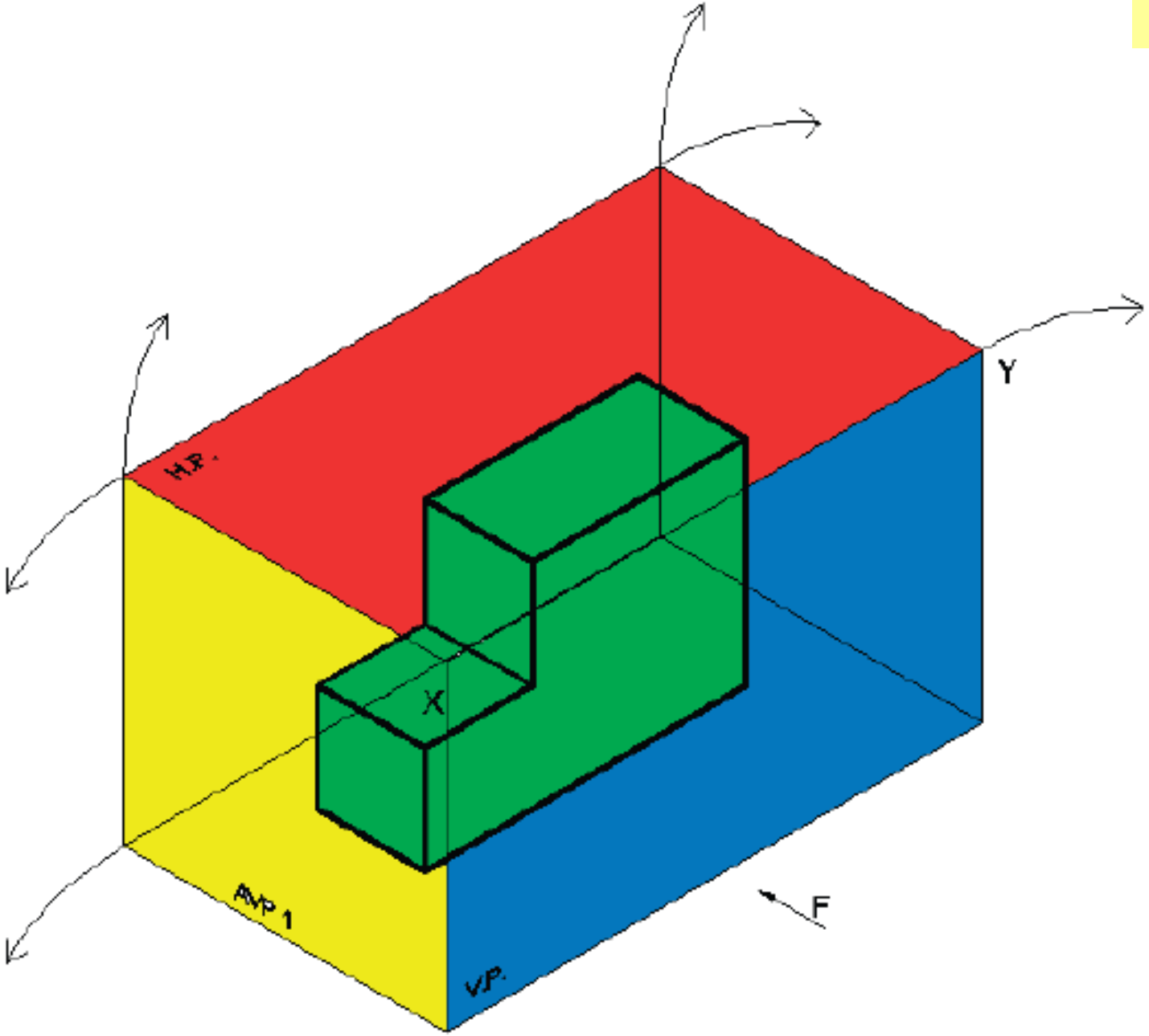
PICTORIAL VIEW OF THE OBJECT KEPT IN I QUADRANT

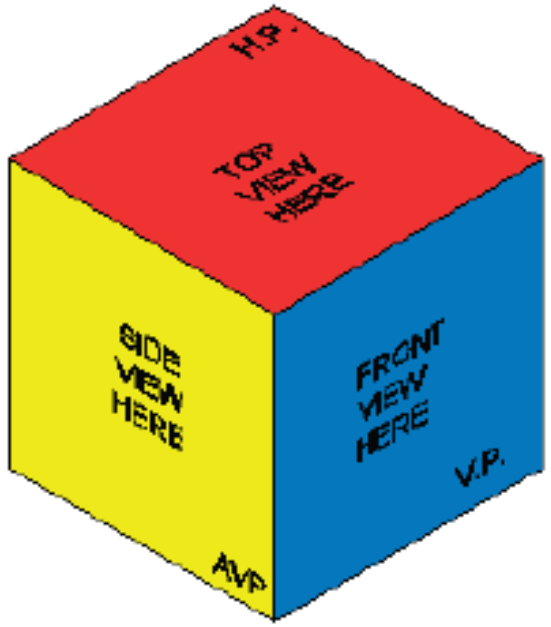


FIRST ANGLE PROJECTION

I ANGLE PROJECTION

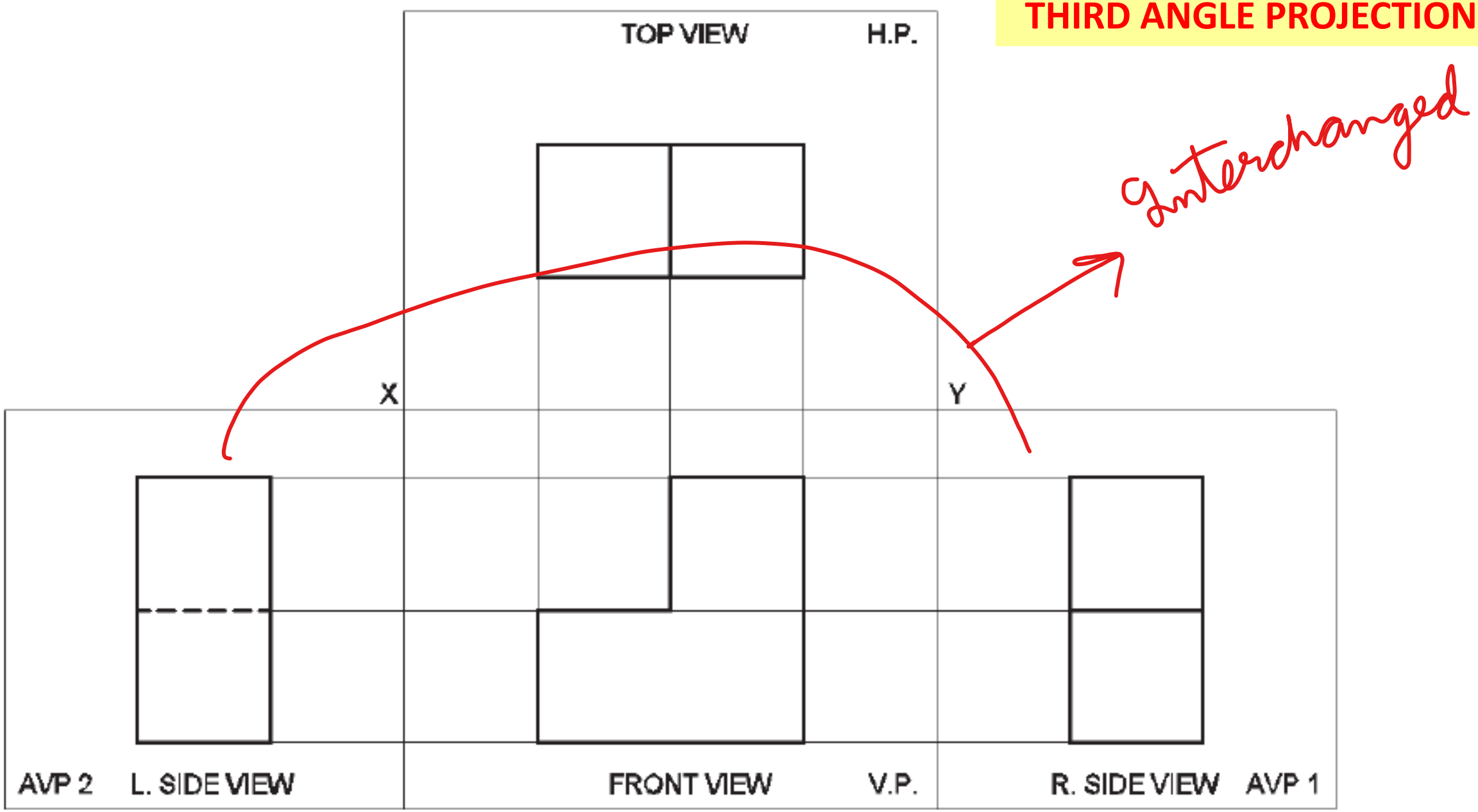
THIRD ANGLE PROJECTION





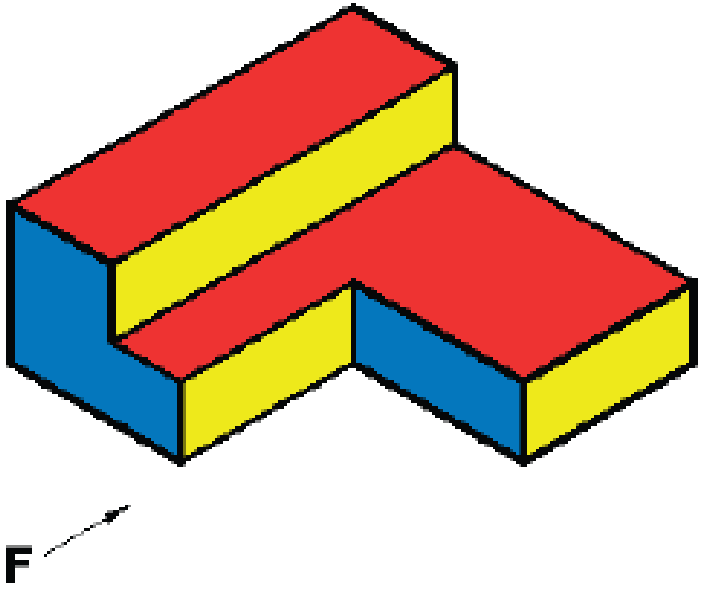
PICTORIAL VIEW OF THE OBJECT KEPT IN III QUADRANT

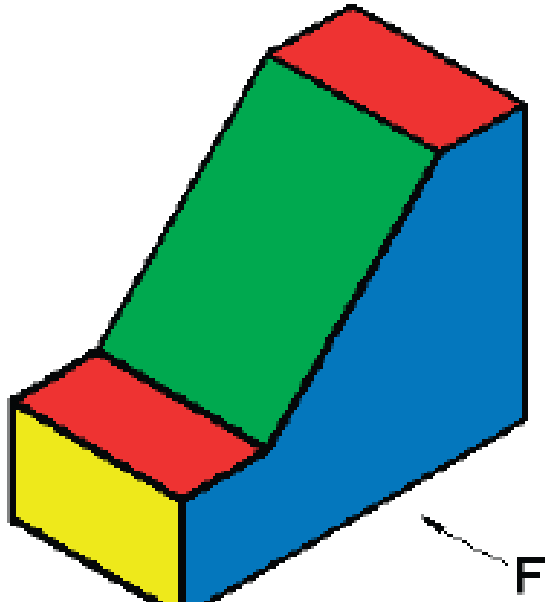
THIRD ANGLE PROJECTION

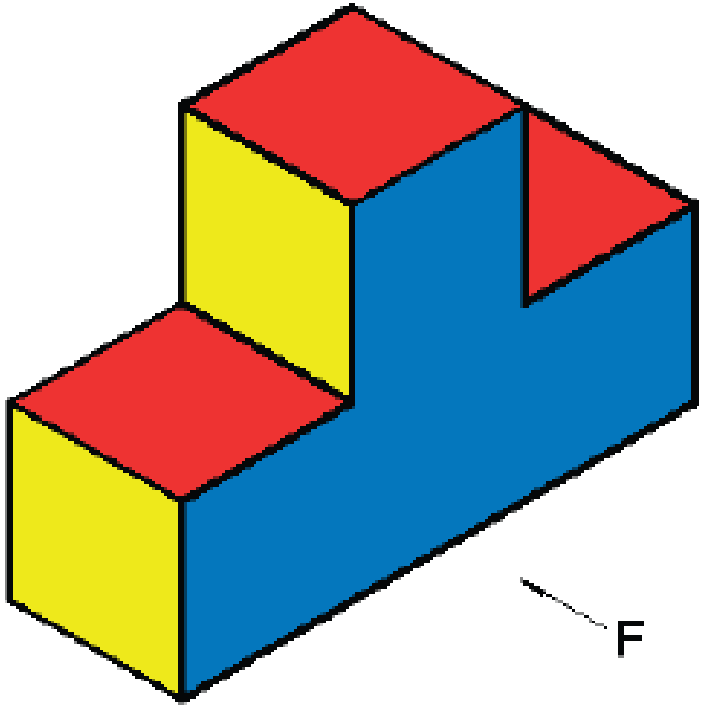


III ANGLE PROJECTION

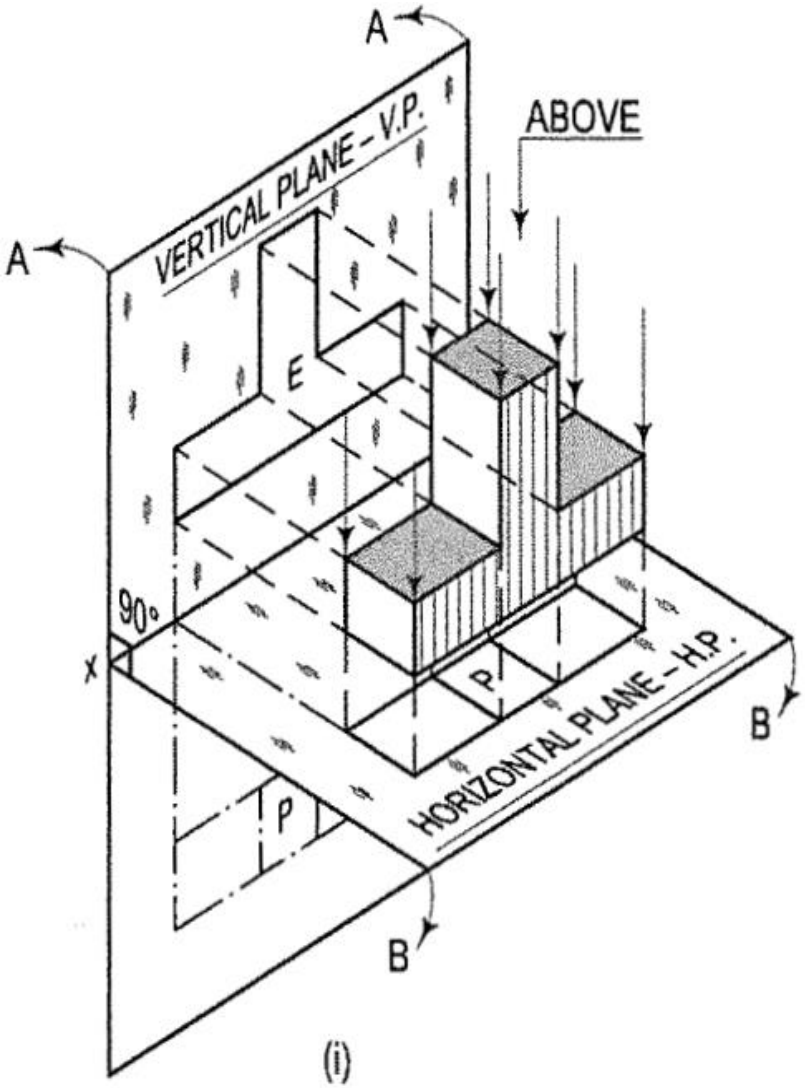
Sketch looking from the direction of arrow
Front View, Top View and side view



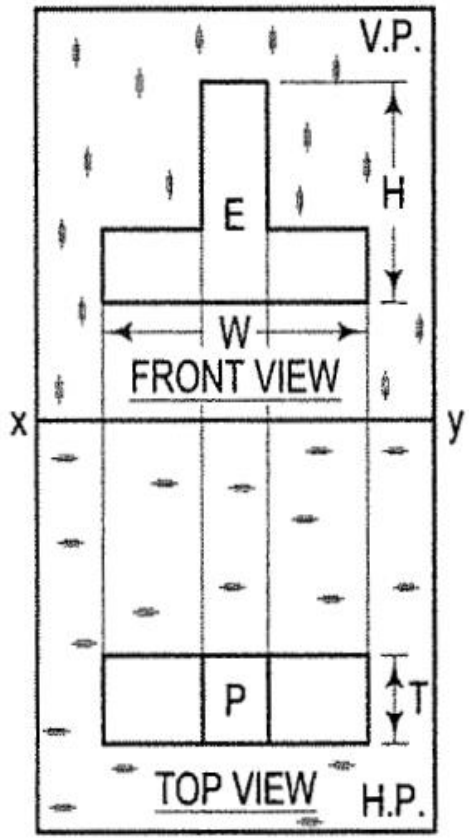




FIRST ANGLE PROJECTION

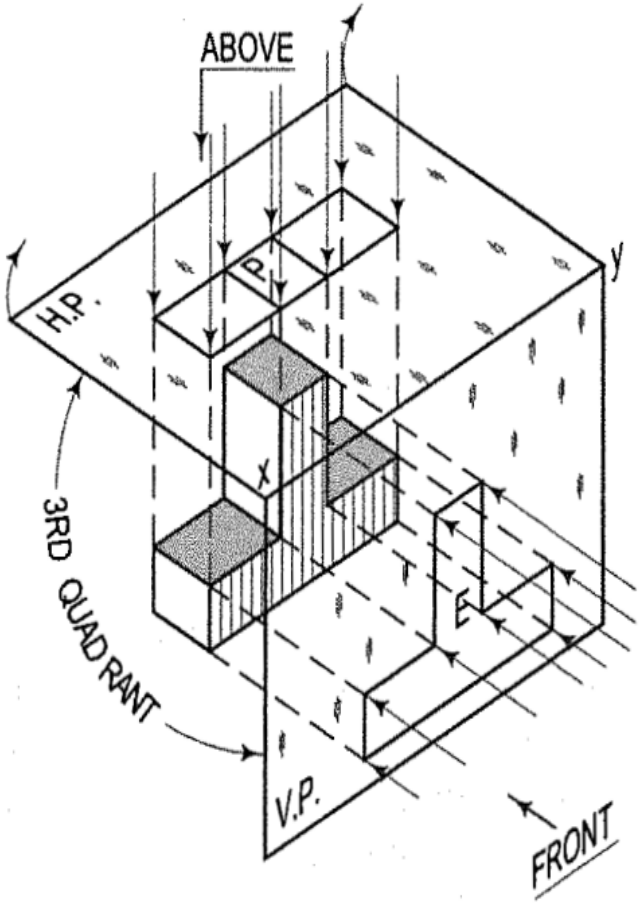


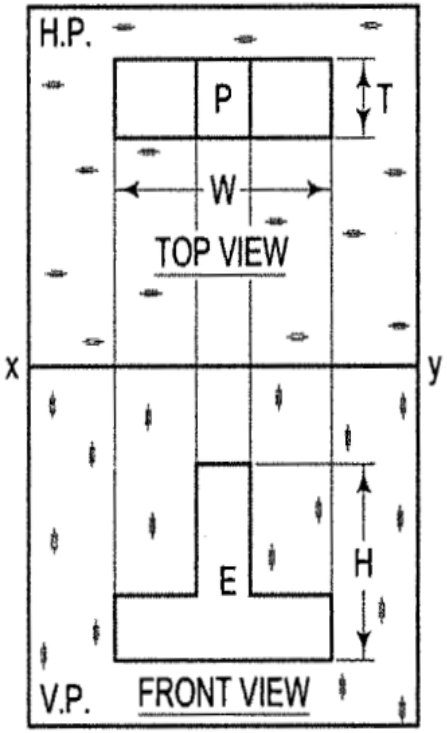
(i)



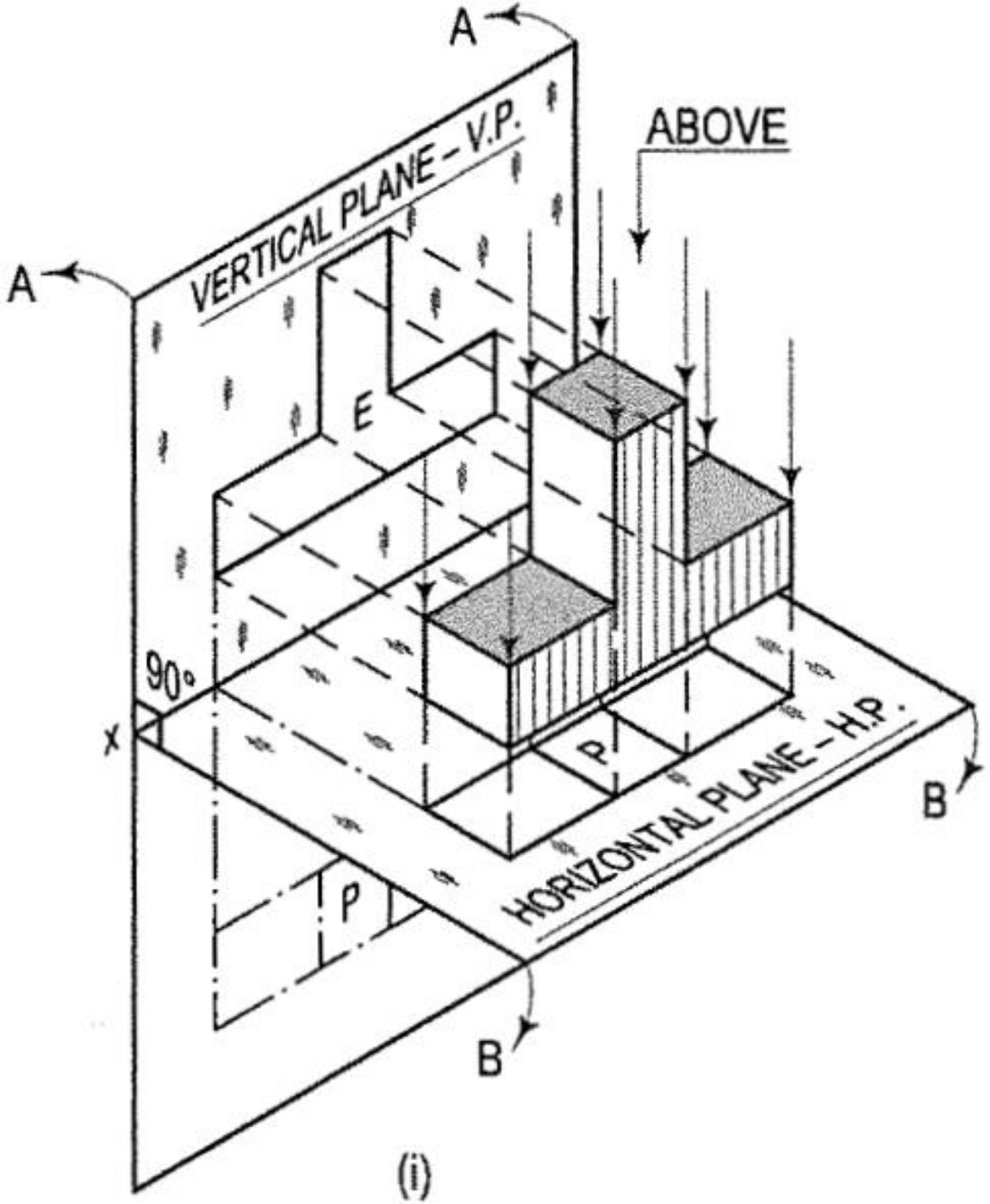
(ii)

THIRD ANGLE PROJECTION

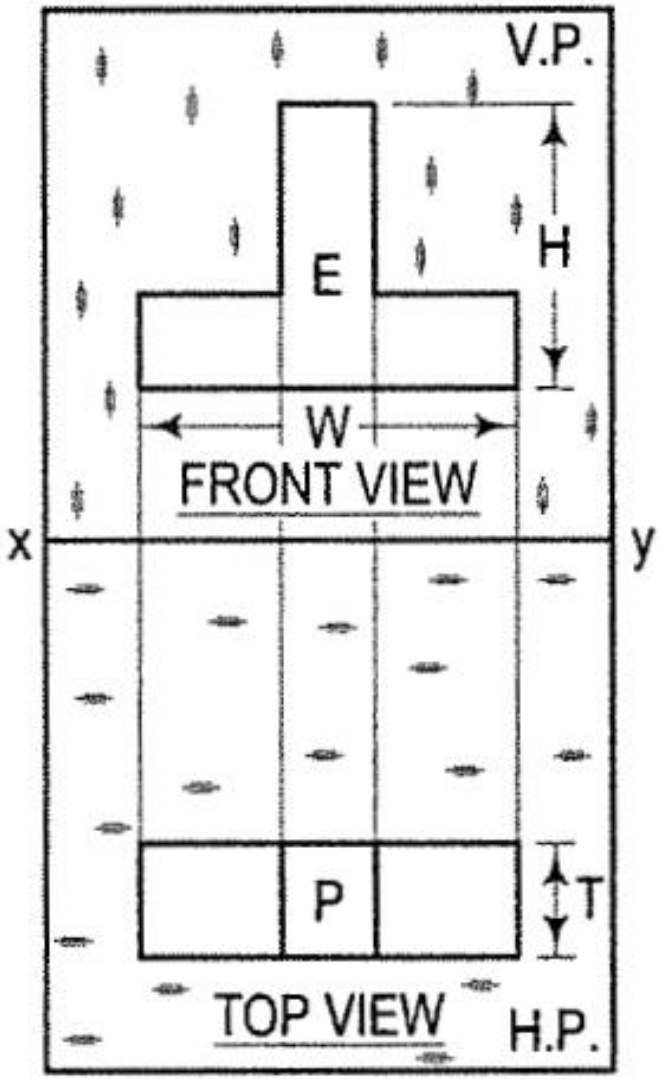




FIRST ANGLE PROJECTION

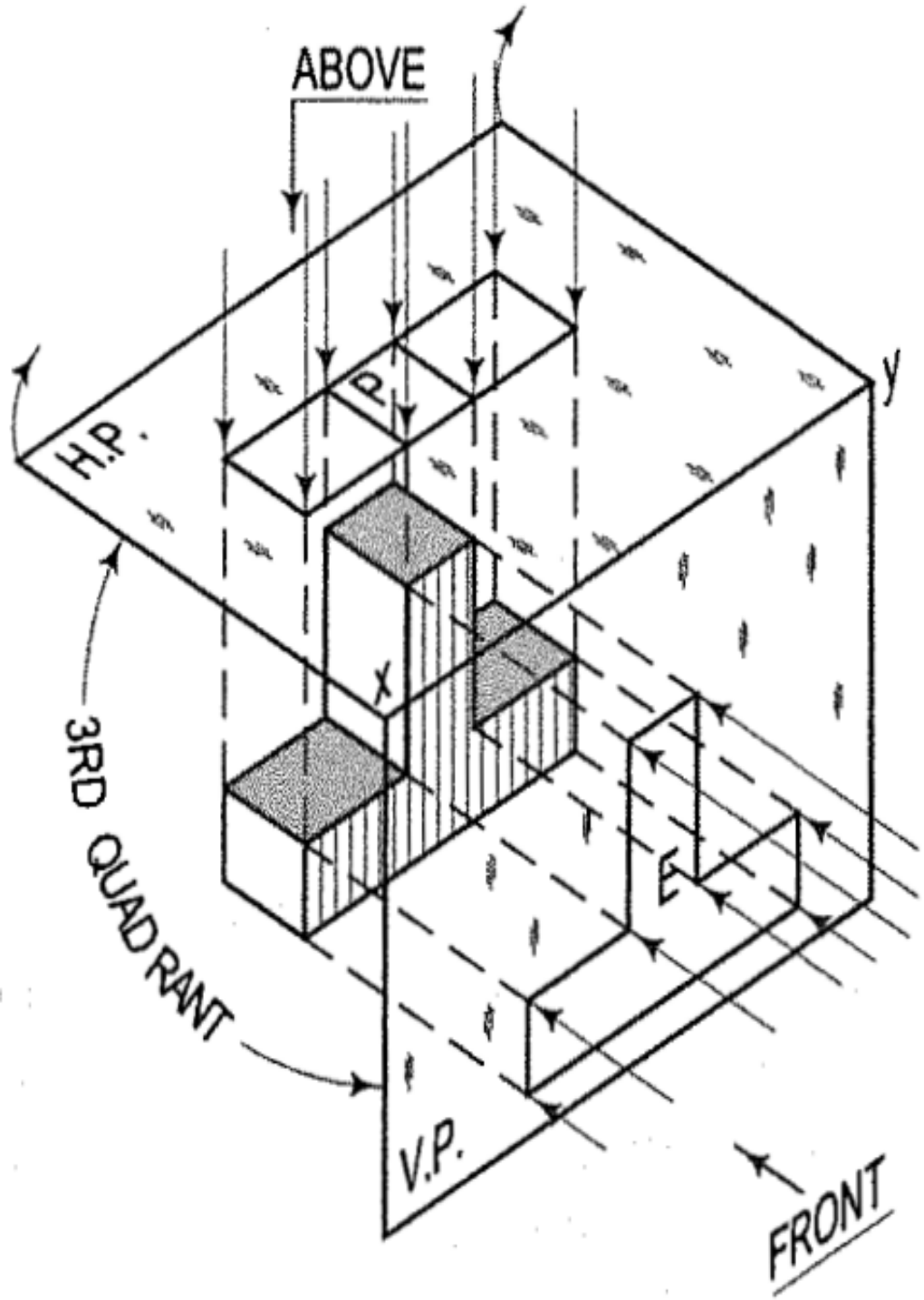


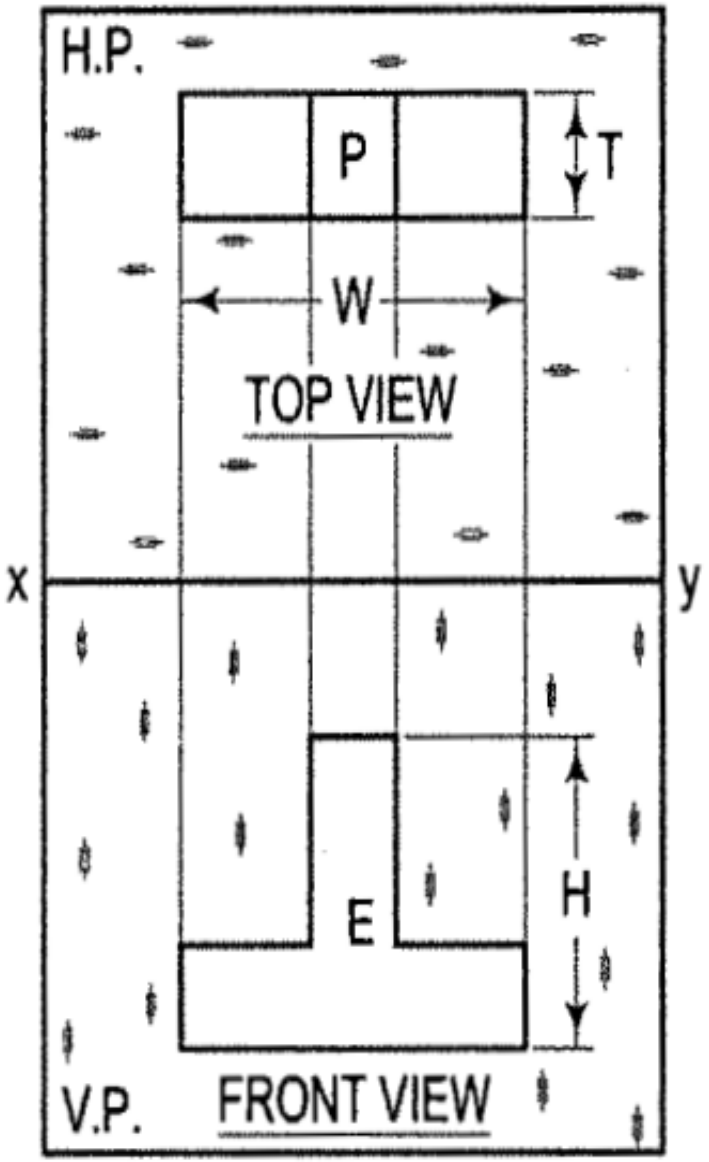
(i)



(ii)

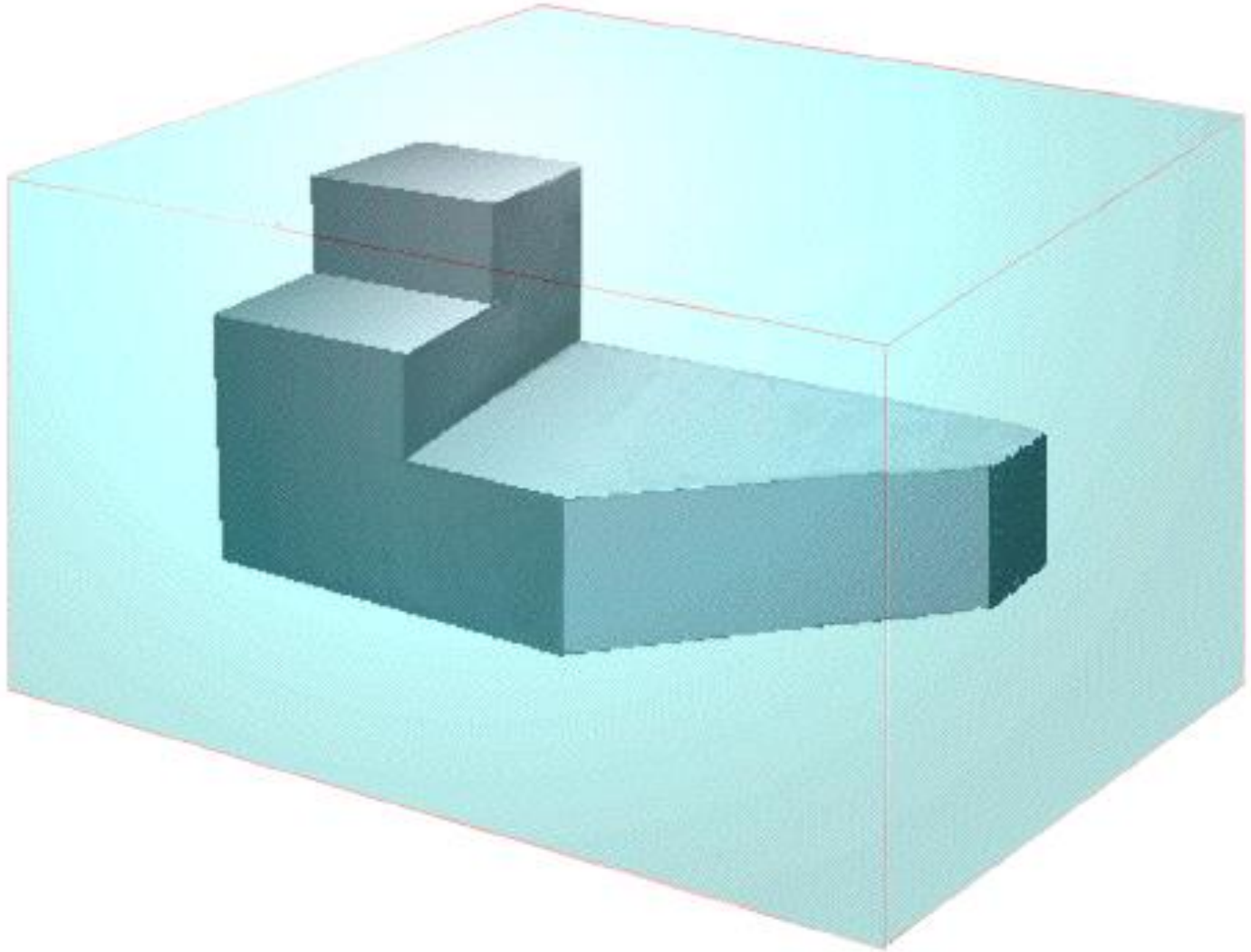
THIRD ANGLE PROJECTION – THIRD QUADRANT



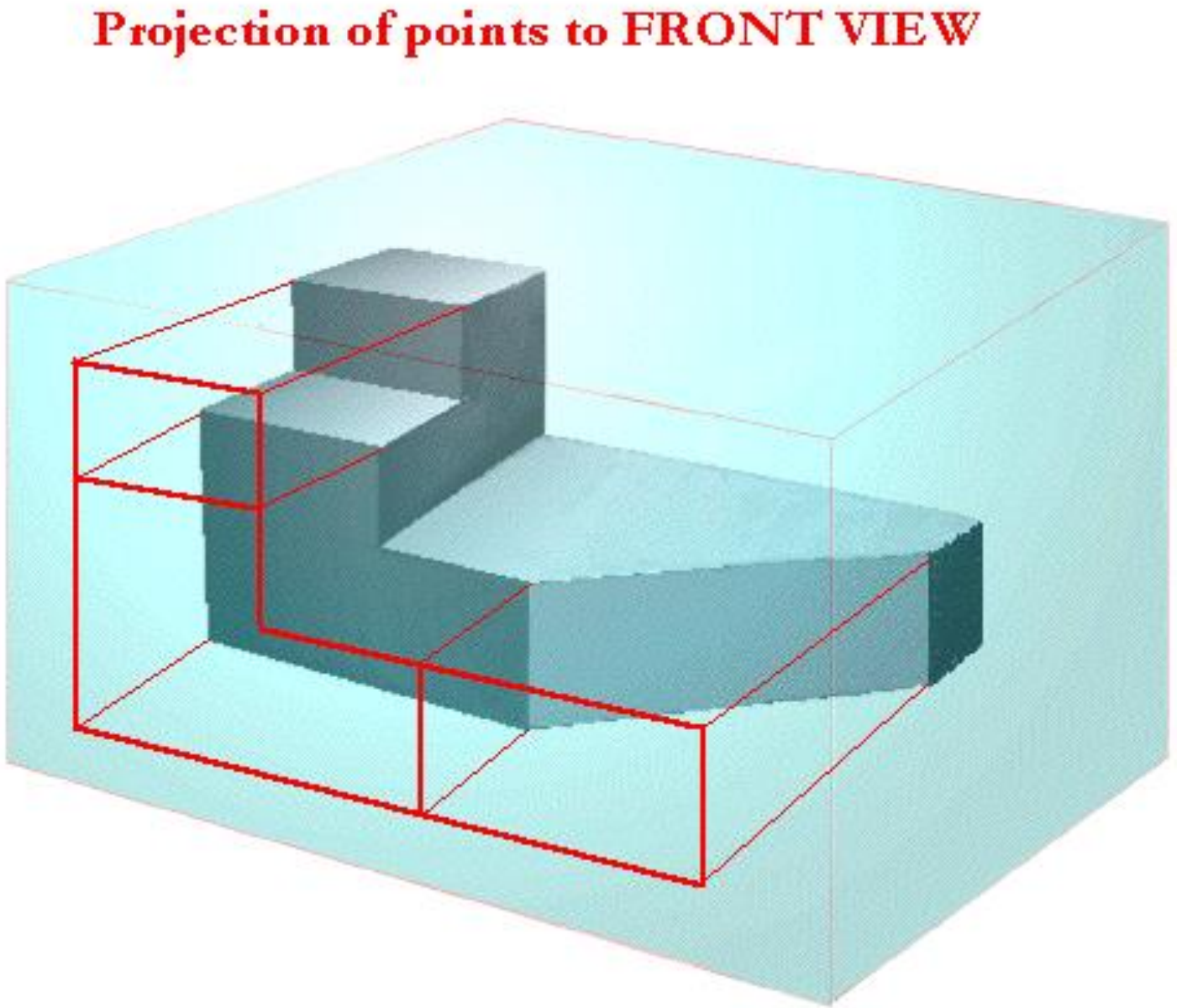


Glass Box Approach

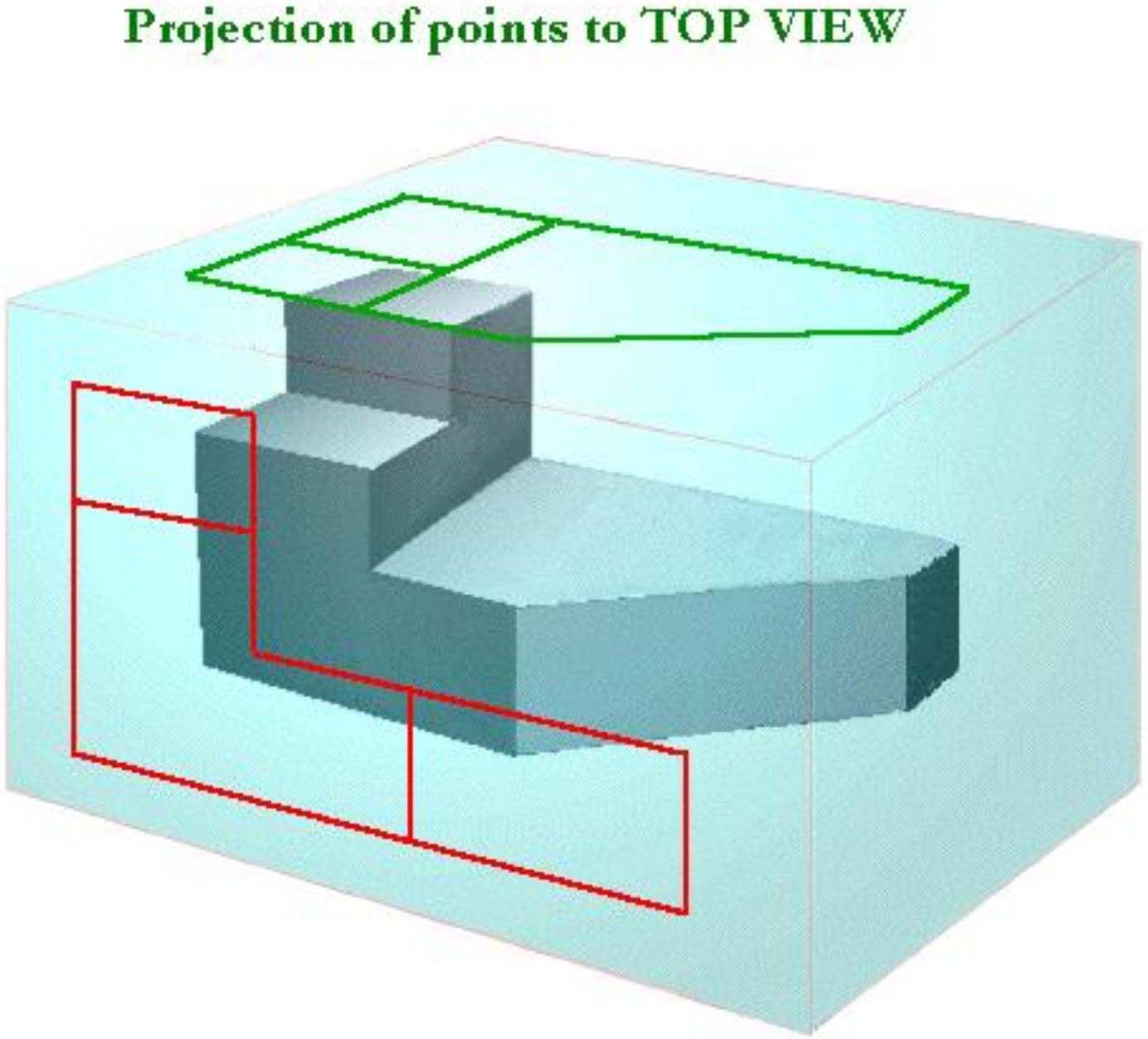
Projection of points to the three views



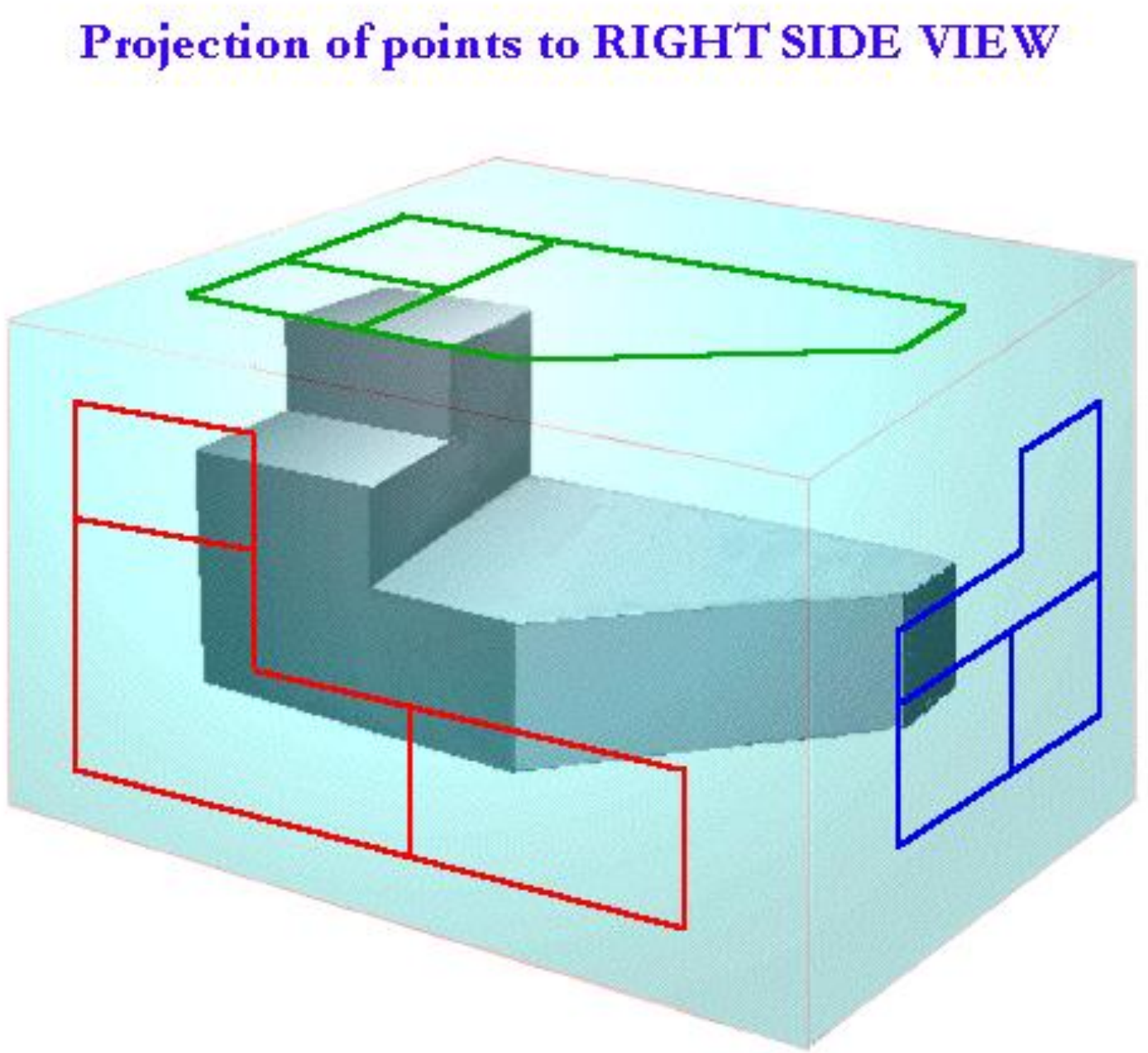
Glass Box Approach



Glass Box Approach

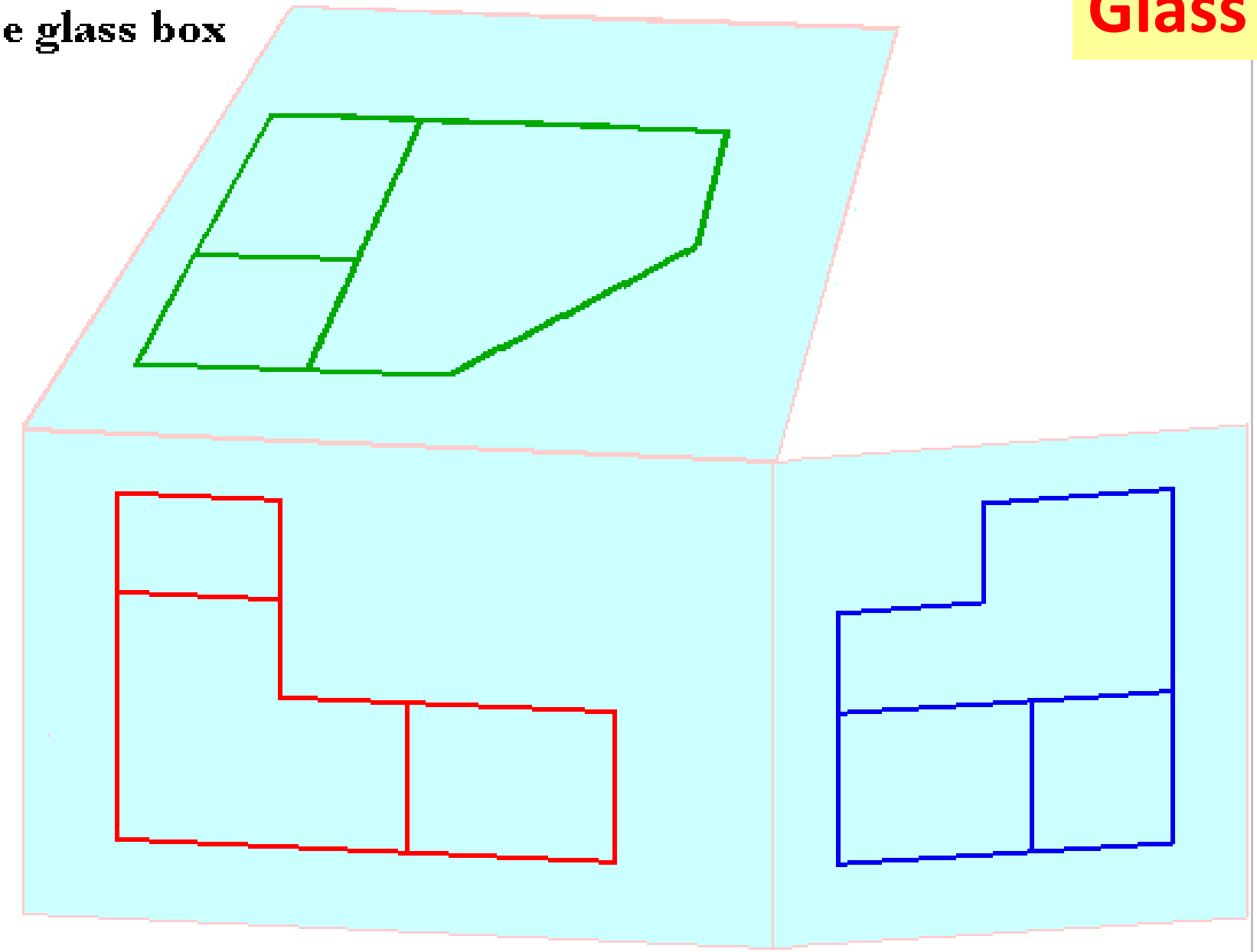


Glass Box Approach

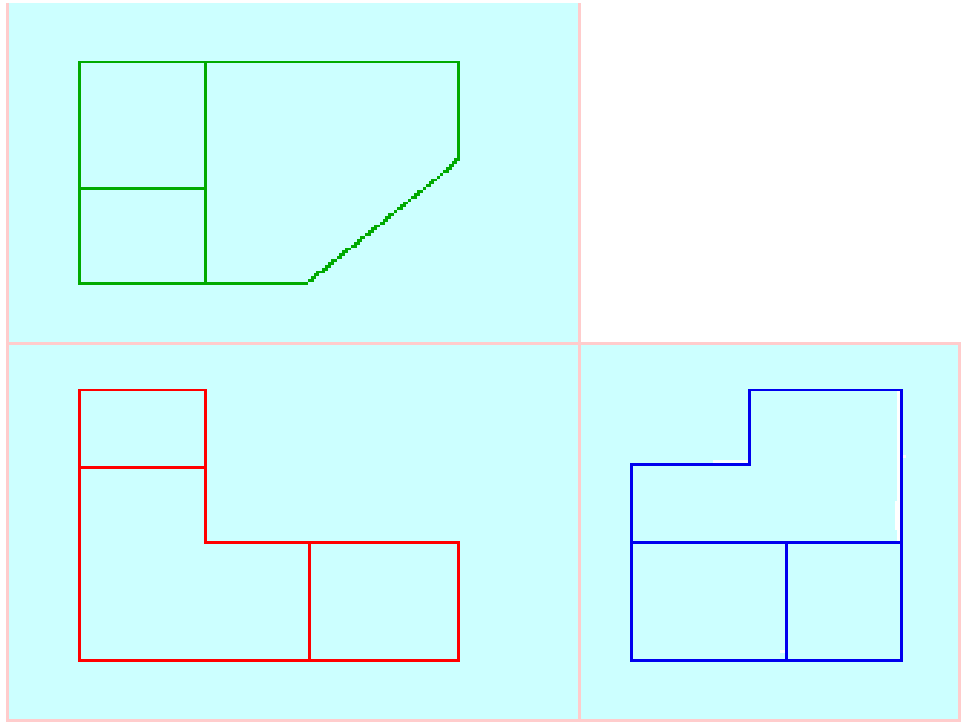


Glass Box Approach

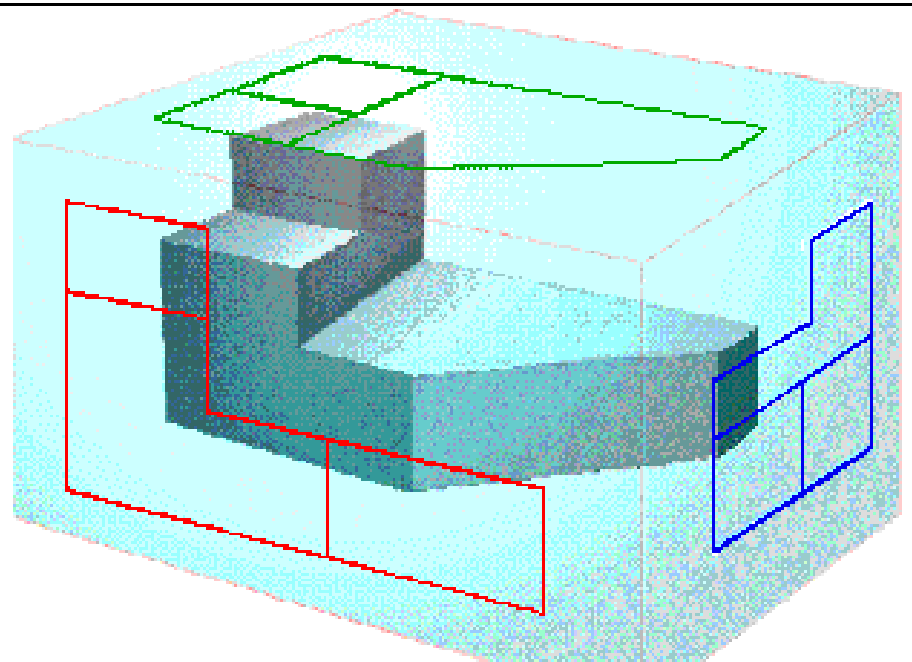
Unfold the glass box

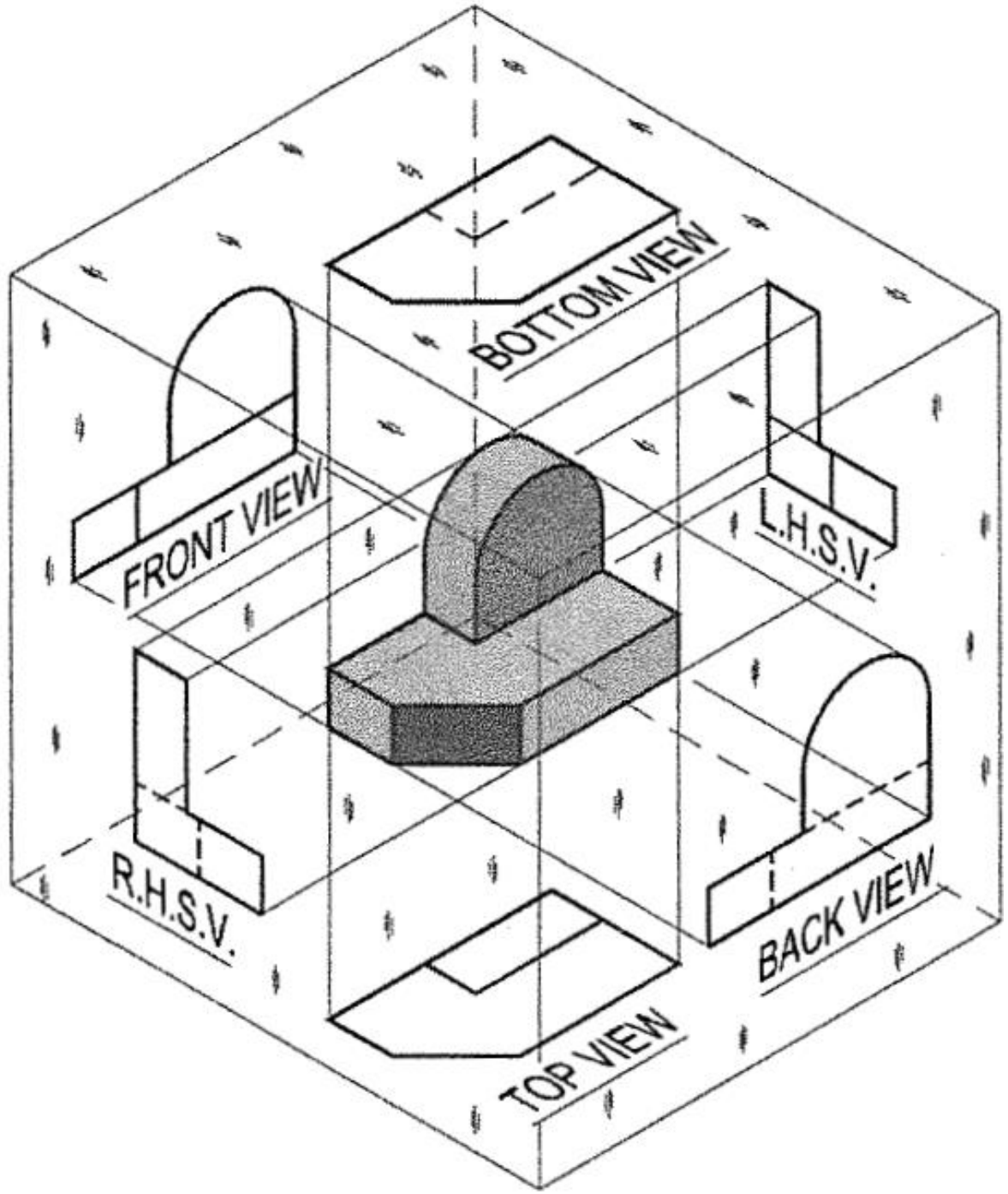


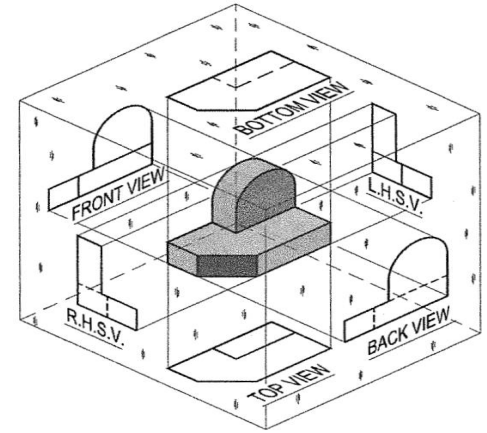
Unfolded glass-box



Object in the glass-box




BOTTOM VIEW
FRONT VIEW
L.H.S.V.
R.H.S.V.
BACK VIEW
TOP VIEW



BOTTOM VIEW

R.H.S.V. FRONT VIEW L.H.S.V. BACK VIEW

TOP VIEW

R.H.S.V. = RIGHT HAND SIDE VIEW

L.H.S.V. = LEFT HAND SIDE VIEW

FIRST ANGLE PROJECTION

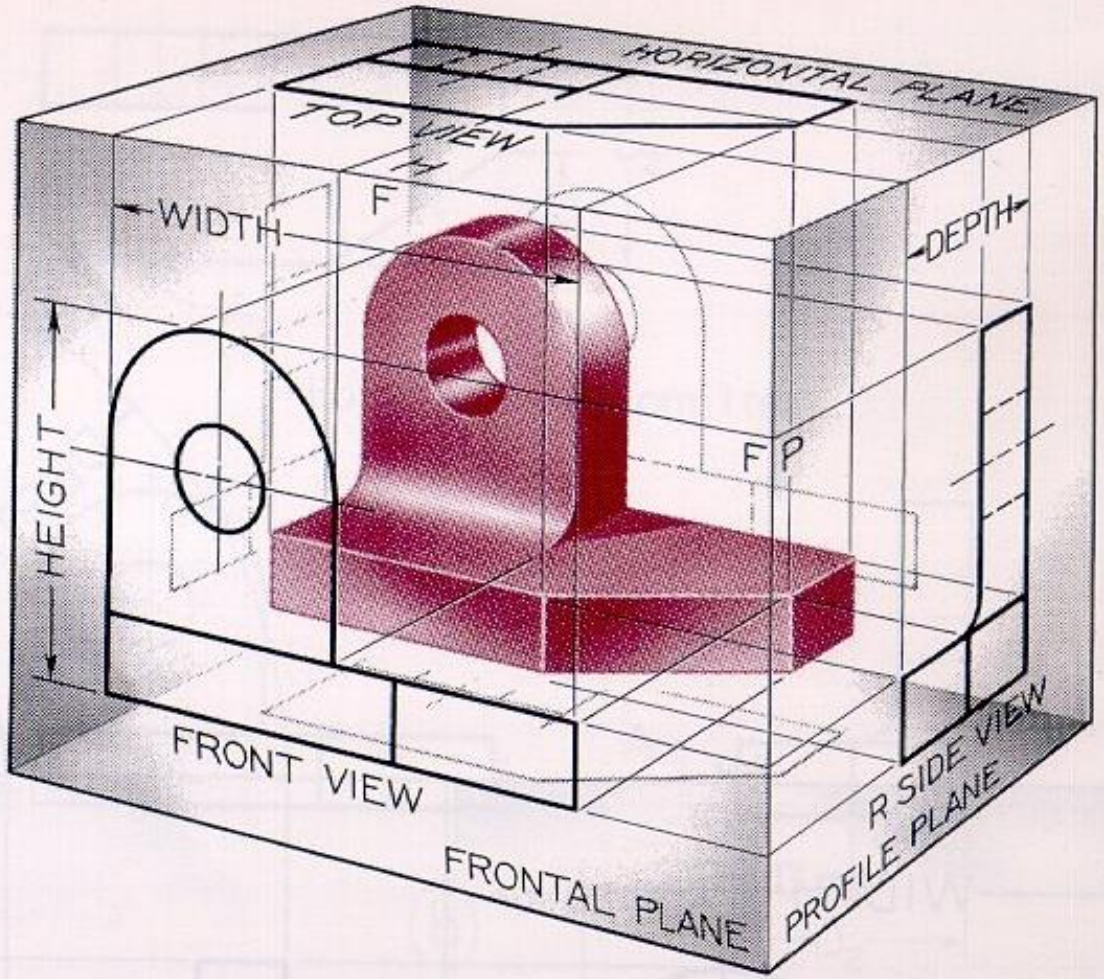
TOP VIEW

L.H.S.V. FRONT VIEW R.H.S.V. BACK VIEW

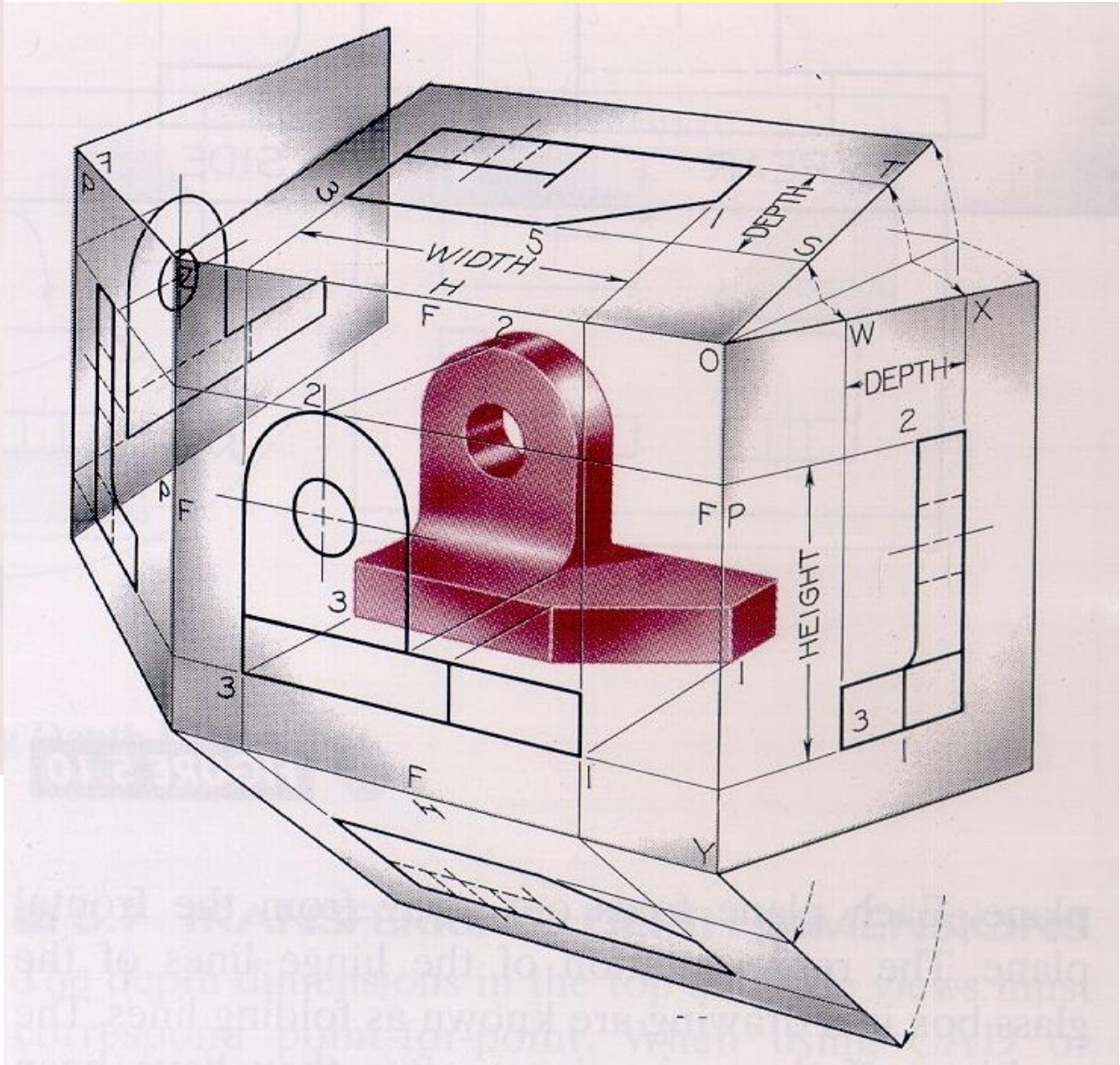
BOTTOM VIEW

THIRD ANGLE PROJECTION

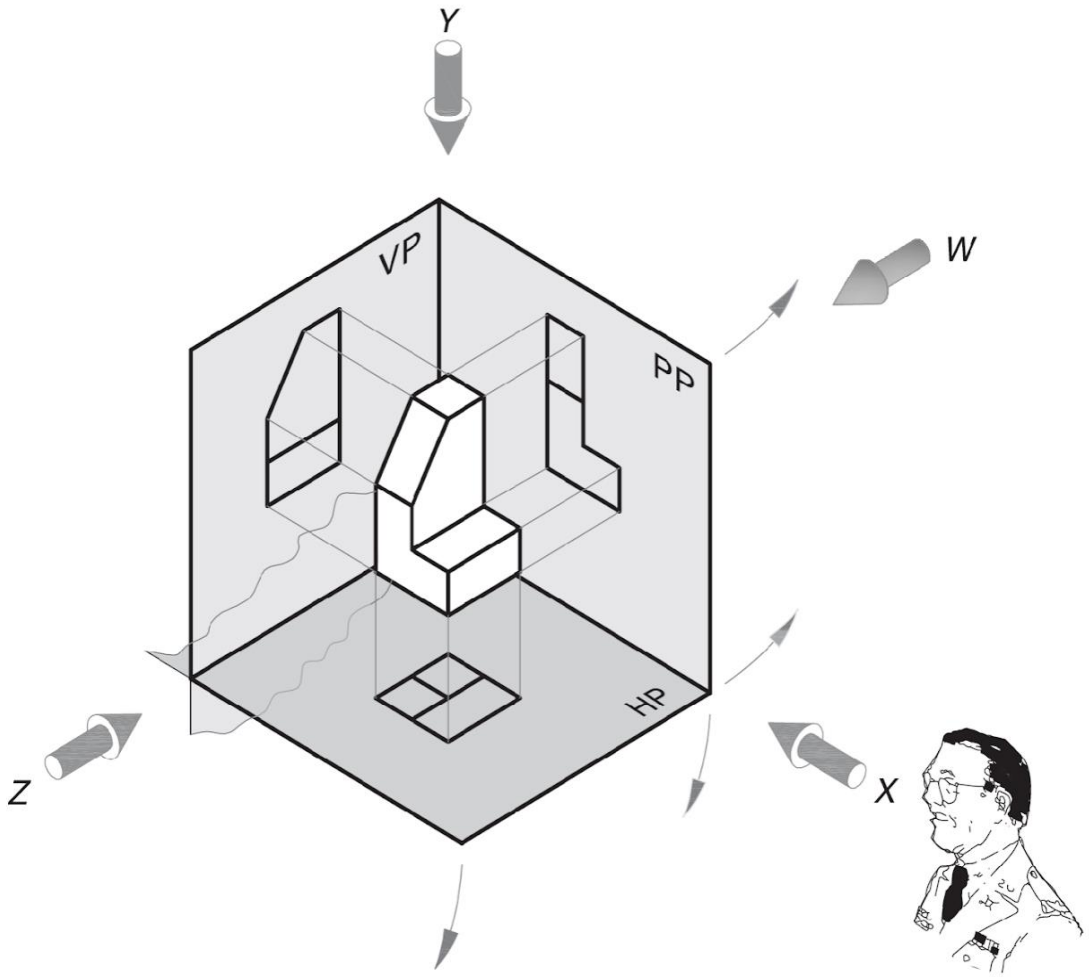
Unfolding the Glass Box



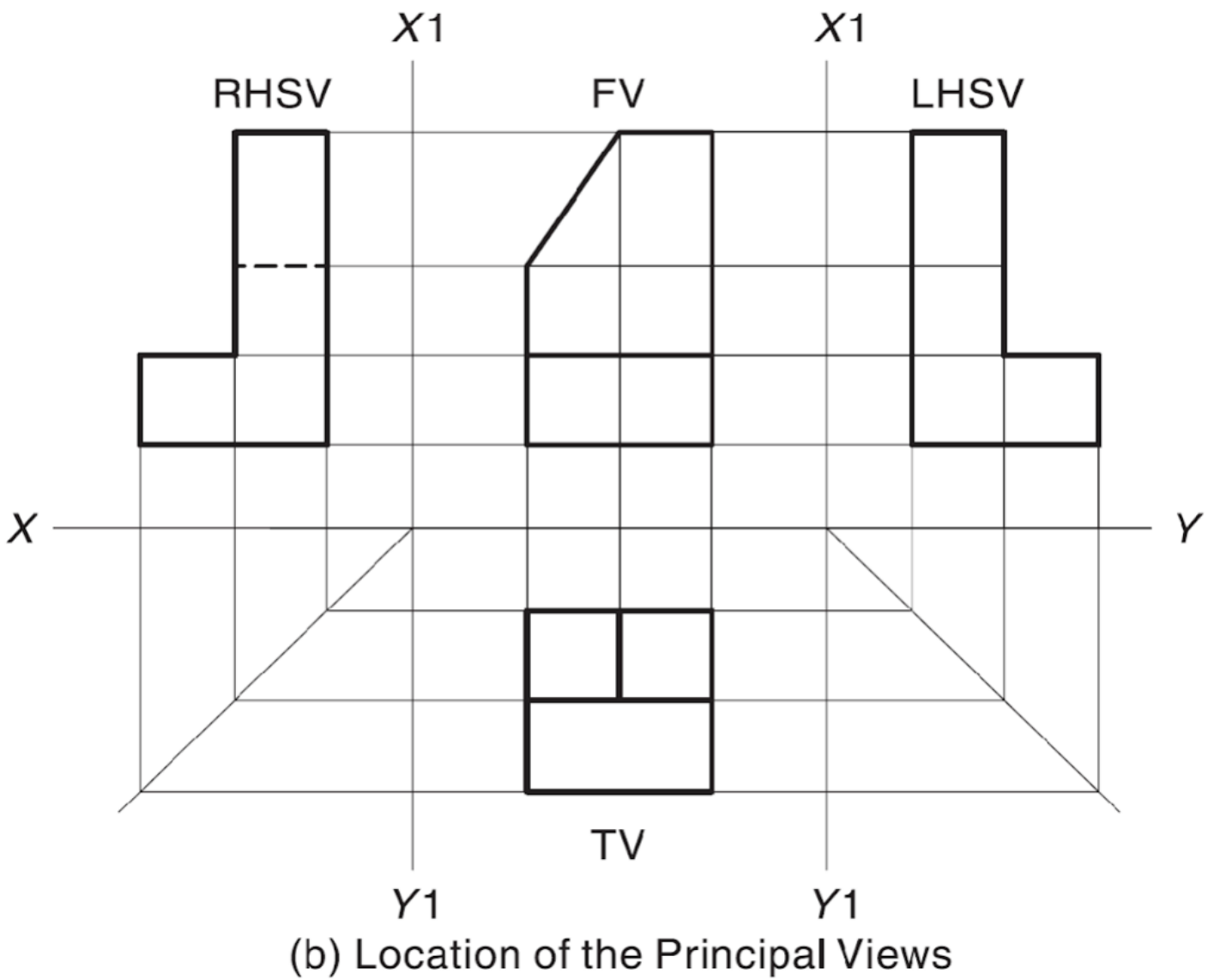
Glass Box Approach



Object lies between projection plane and observer



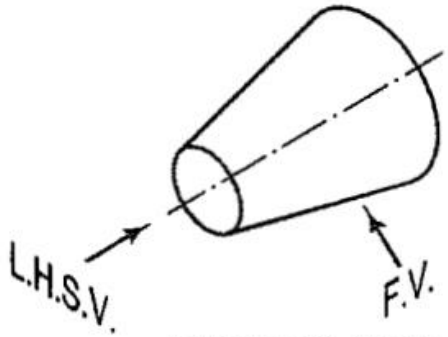
(a) Object in First Angle



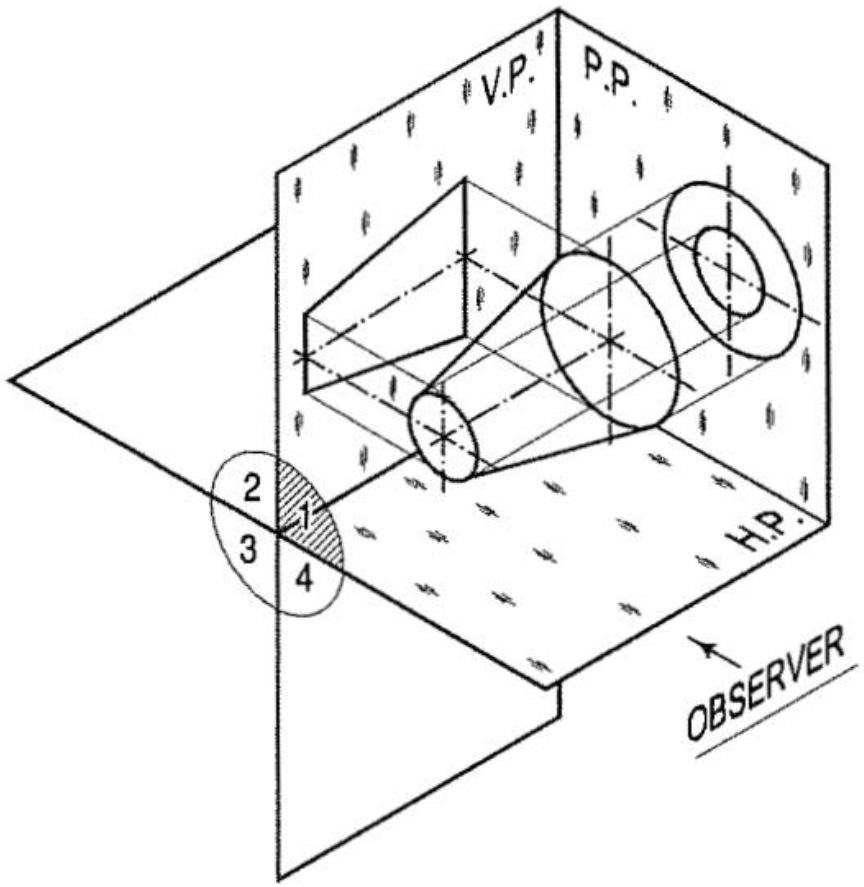
(b) Location of the Principal Views

FIRST ANGLE PROJECTION

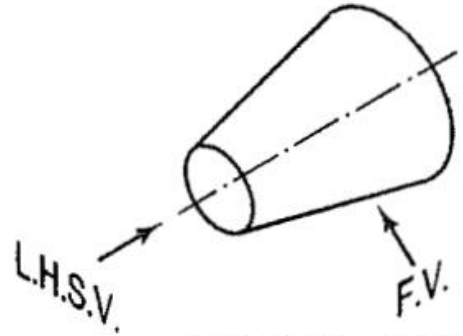
FIRST ANGLE PROJECTION METHOD



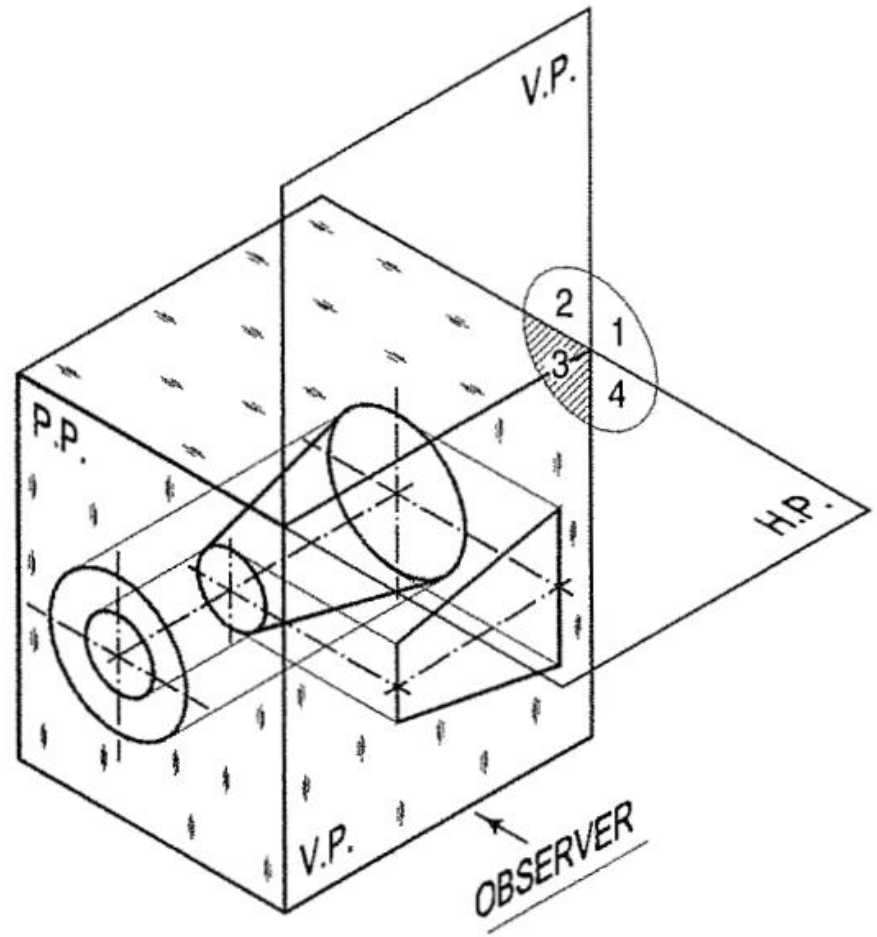
PICTORIAL VIEW

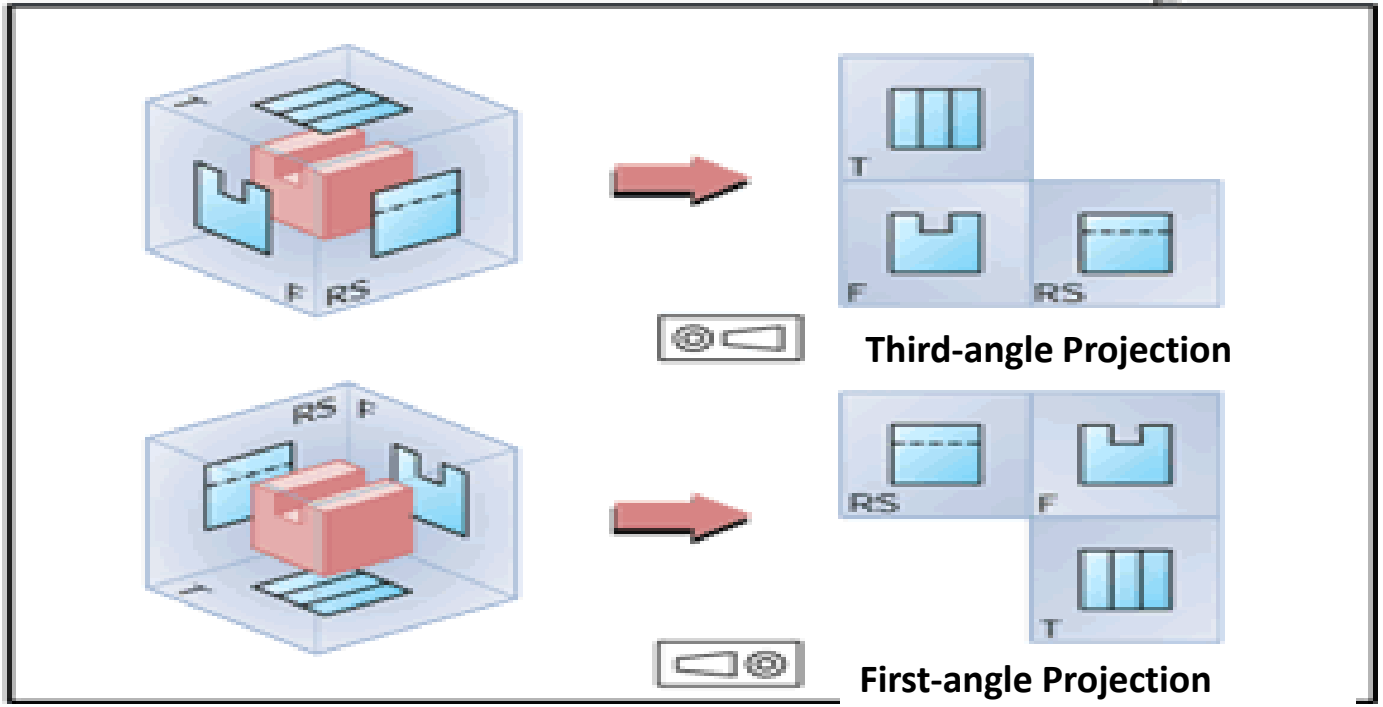


THIRD ANGLE PROJECTION METHOD



PICTORIAL VIEW



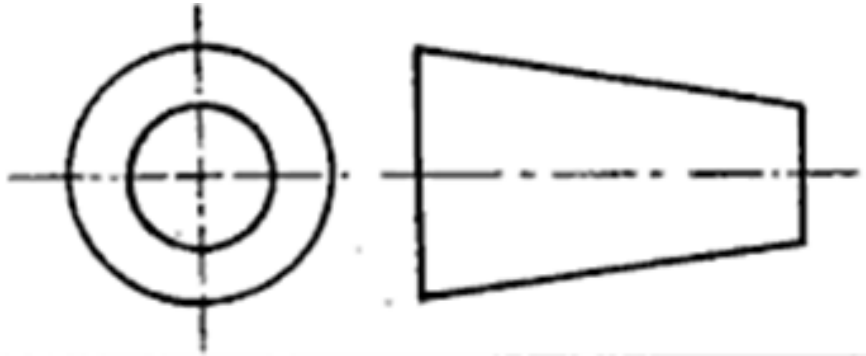


FIRST ANGLE PROJECTION

Object lies between the observer and the planes of projection

Front view comes above the top view

Object is situated on or above the horizontal plane

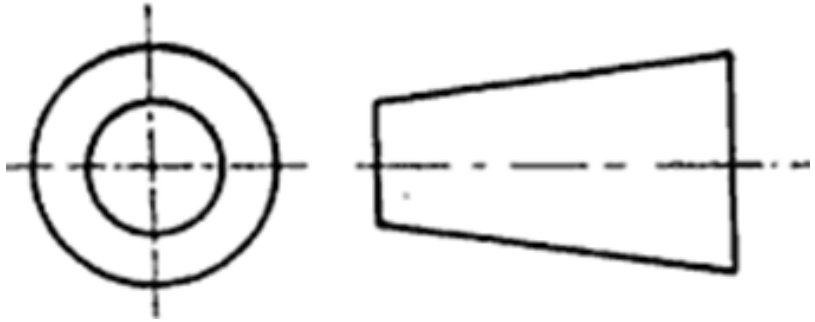


THIRD ANGLE PROJECTION

Planes of projection lie between the object and observer

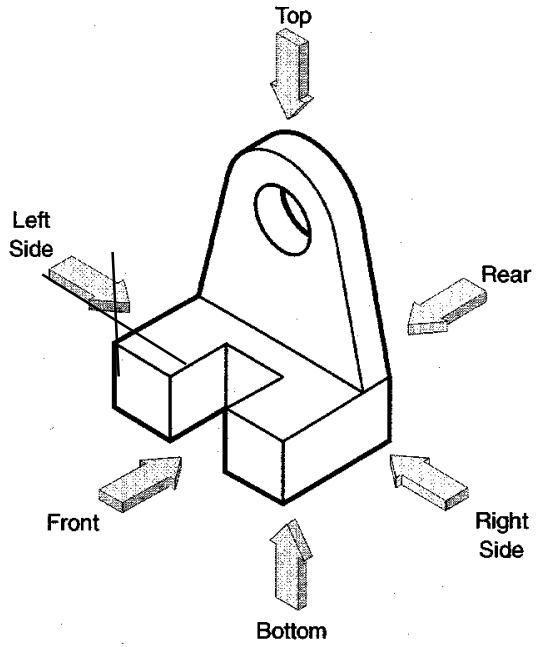
Top view comes above the front view

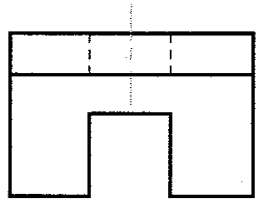
Object is situated on or above the ground

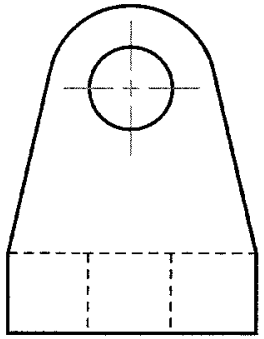


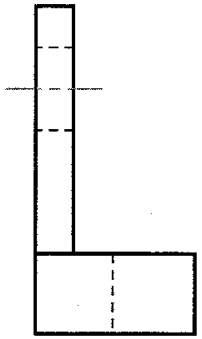
Orthographic Projection Fundamentals

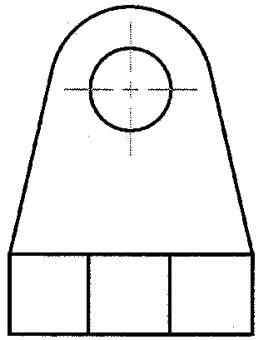
Defining Six Principal Views or Orthographic Views

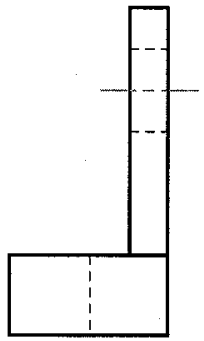


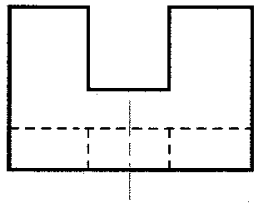

Top


Rear


Left Side


Front


Right Side


Bottom

LINES on an engineering drawing signify more than just the geometry of the object and it is important that the appropriate line type is used.

Line Thickness

For most engineering drawings you will require two thickness', a thick and thin line.

The general recommendation are that thick lines are twice as thick as thin lines.

LINE STYLES

	A thick continuous line is used for visible edges and outlines.
	A thin line is used for hatching, leader lines, short centre lines, dimensions and projections.

Other line styles used to clarify important features on drawings are:

	Thin chain lines are a common feature on engineering drawings used to indicate centre lines. Centre lines are used to identify the centre of a circle, cylindrical features, or a line of symmetry.
	Dashed lines are used to show important hidden detail for example wall thickness and holes

Precedence of Lines

- Visible lines takes precedence over all other lines

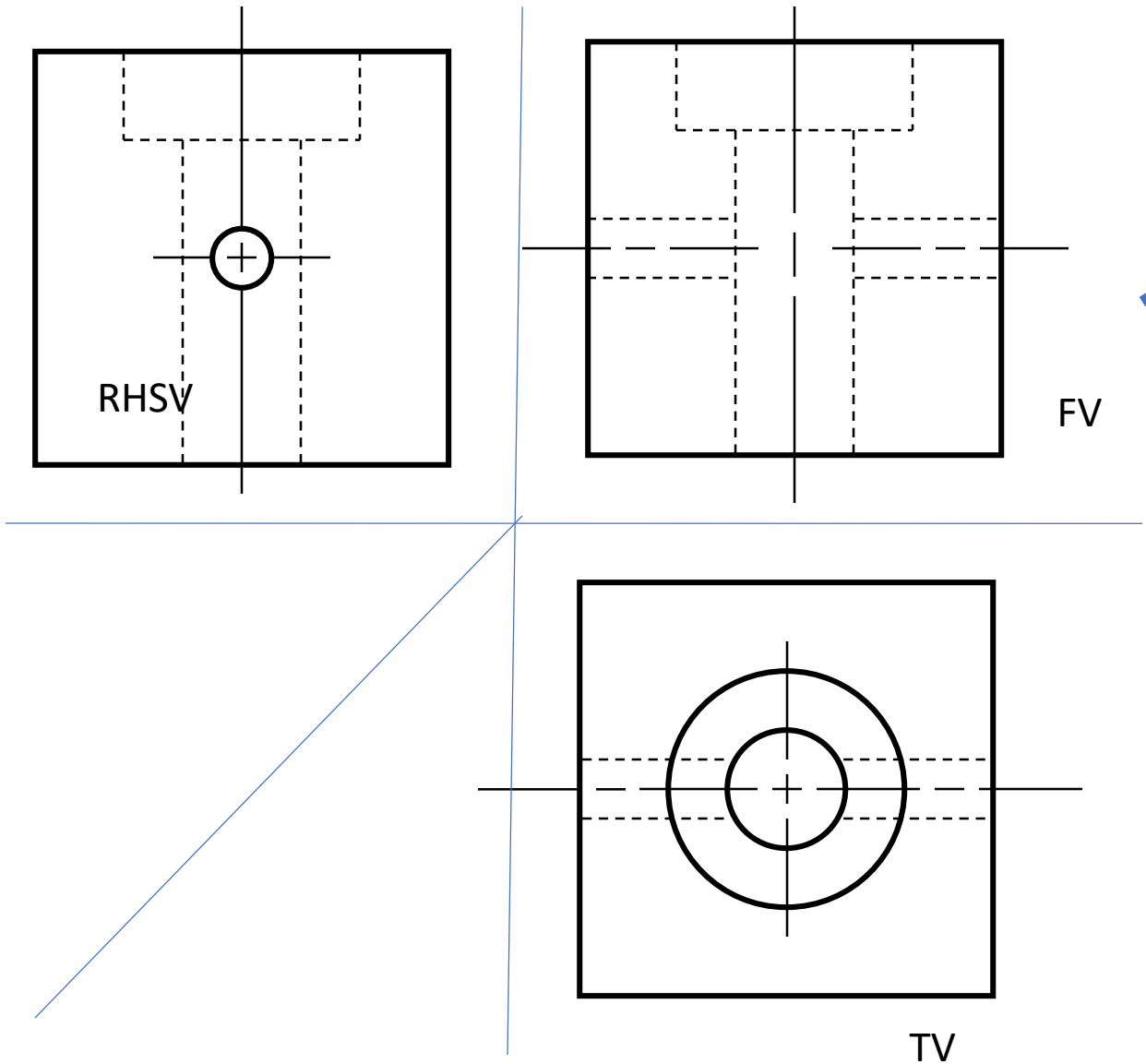
 0.6 mm

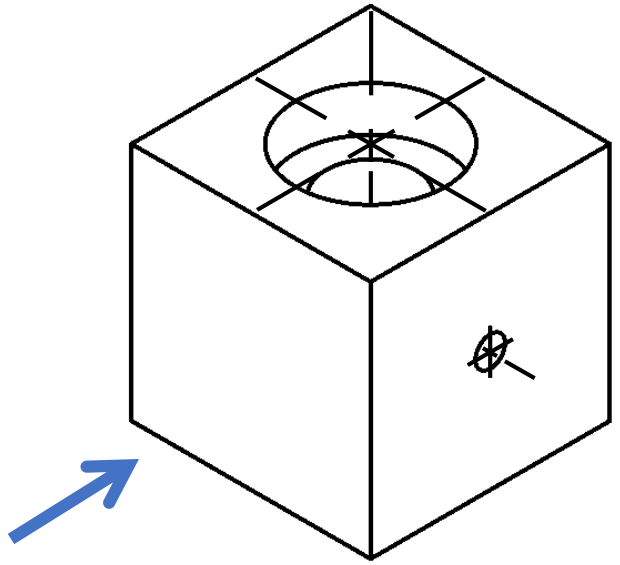
- Hidden lines and cutting plane lines

 0.3 mm

- Center lines

For Example:

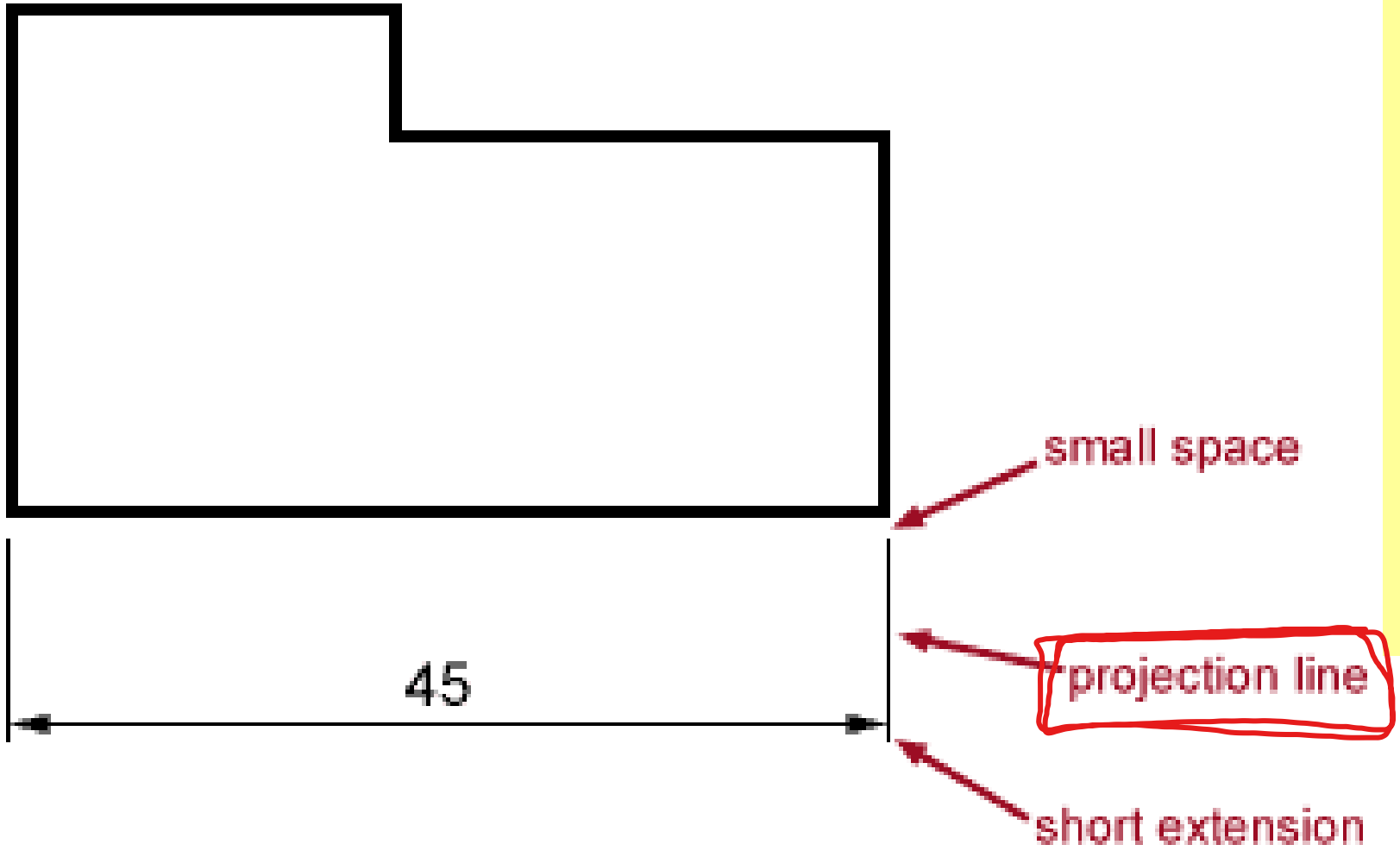




1. **Visible**
2. **Hidden**
3. **Center**

DIMENSIONING

A dimensioned drawing should provide all the information necessary for a finished product or part to be manufactured.



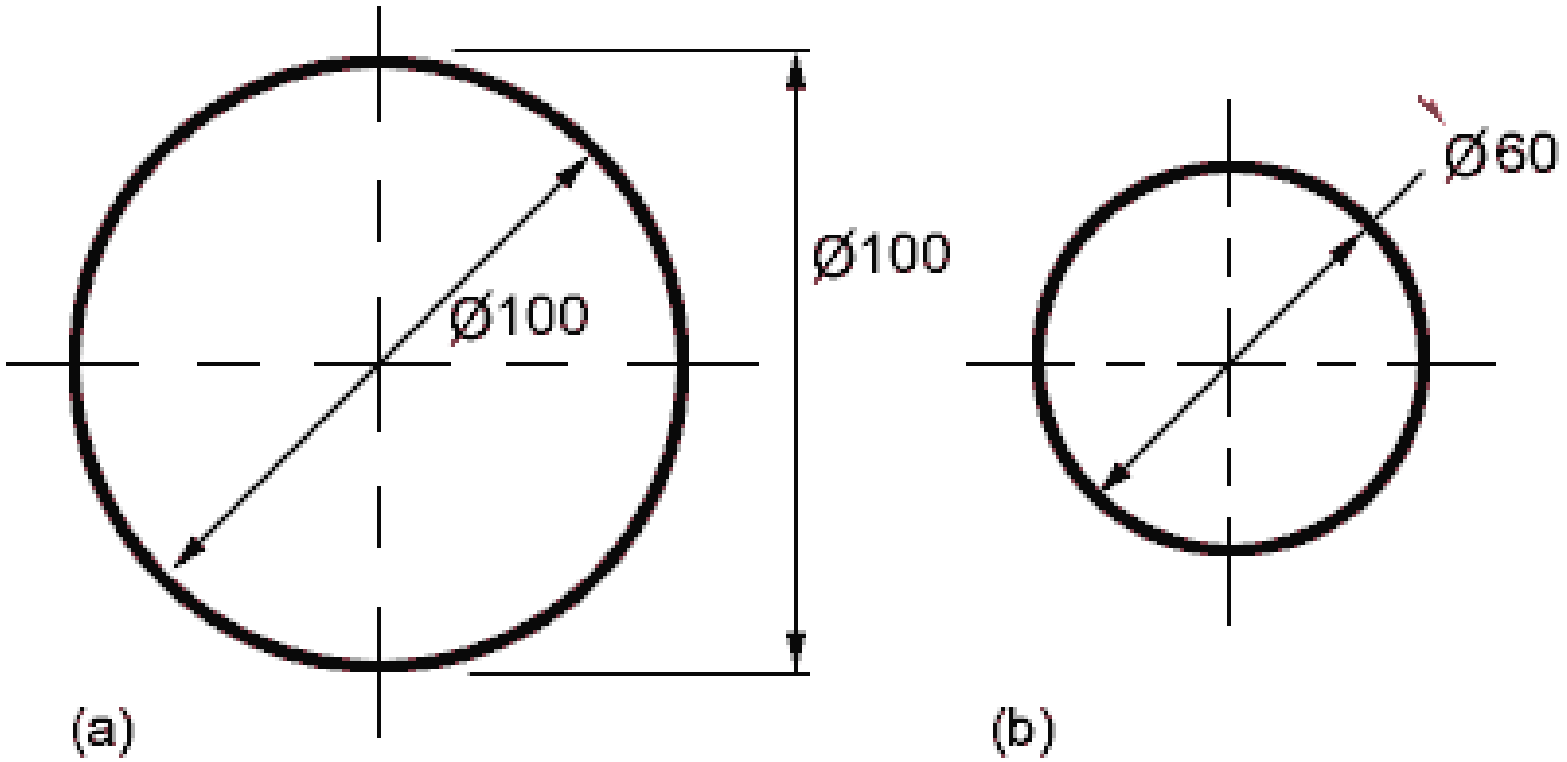
Dimensions are always drawn using continuous thin lines.

Two projection lines indicate where the dimension starts and finishes.

Projection lines do not touch the object and are drawn perpendicular to the element you are dimensioning.

All dimensions less than 1 should have a leading zero. i.e. .35 should be written as 0.35

Dimensioning of circles

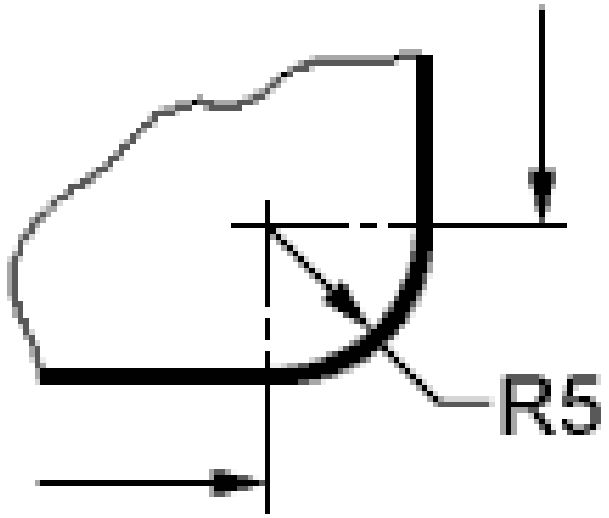


(a) shows two common methods of dimensioning a circle. One method dimensions the circle between two lines projected from two diametrically opposite points. The second method dimensions the circle internally.

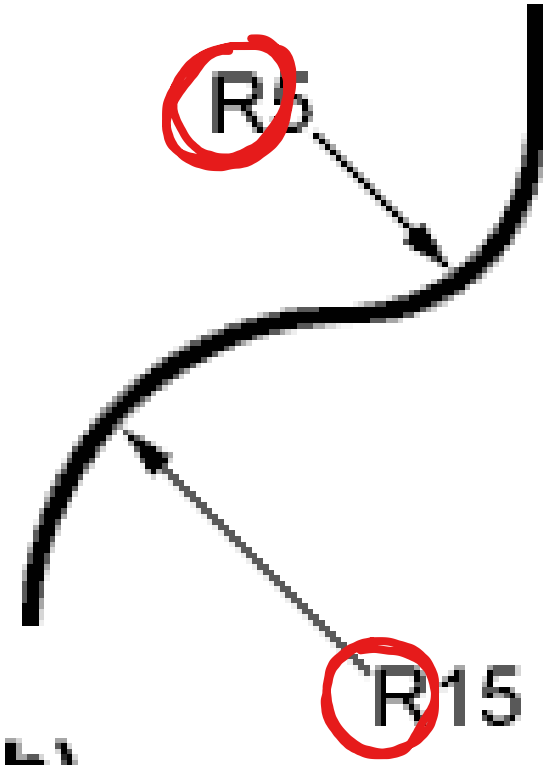
(b) is used when the circle is too small for the dimension to be easily read if it was placed inside the circle.

DIMENSIONING RADII

All radial dimensions are proceeded by the capital R.



(a)

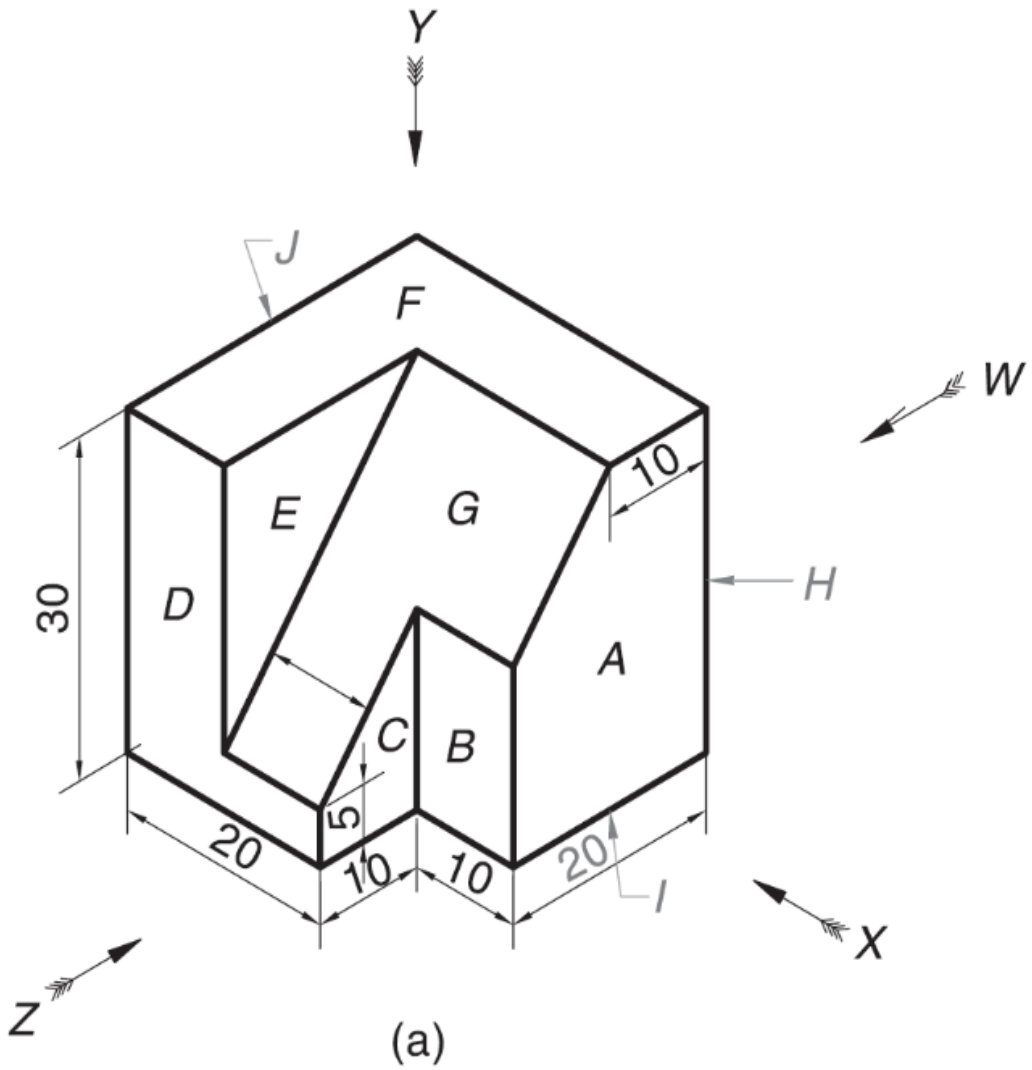


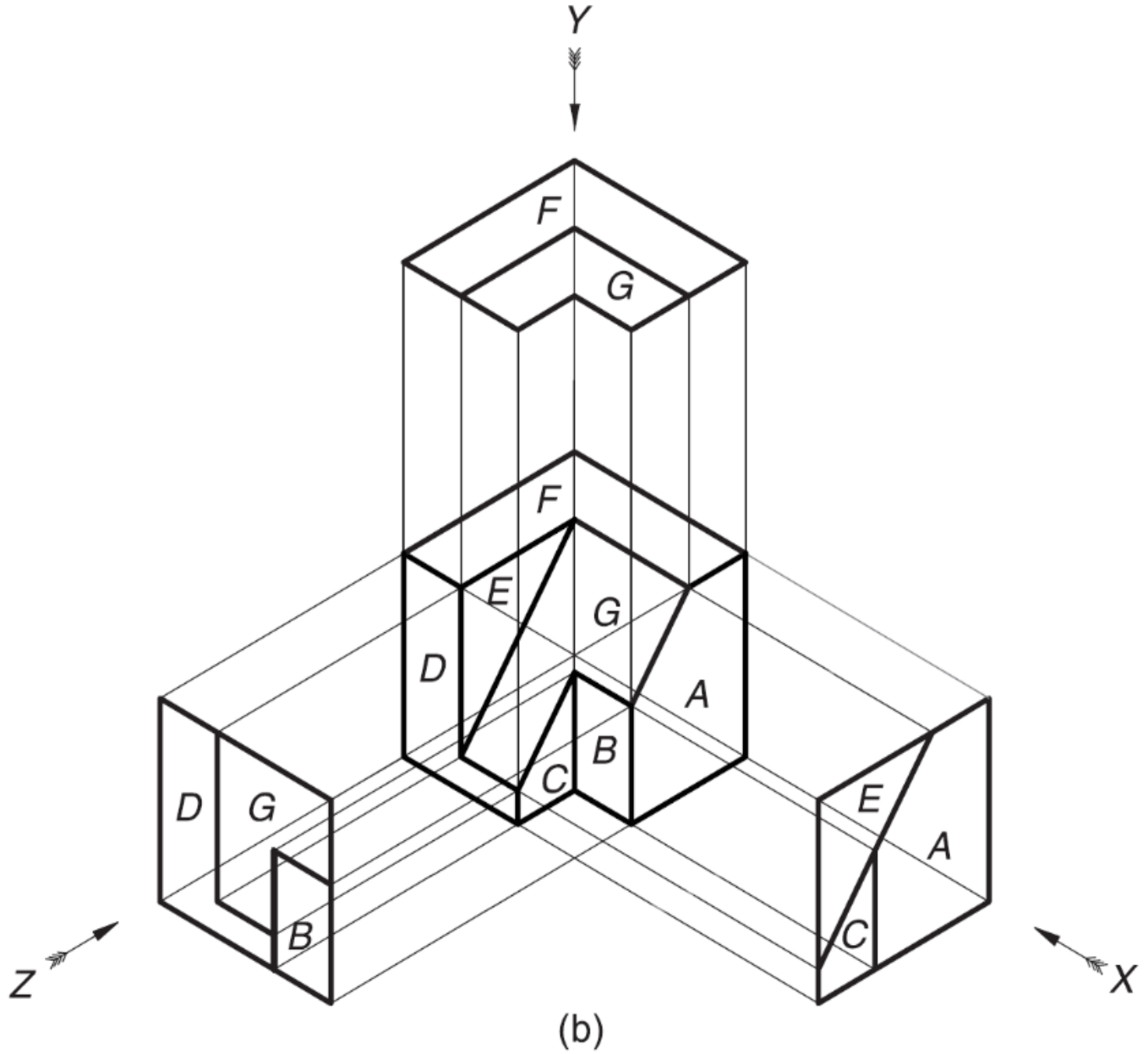
(b)

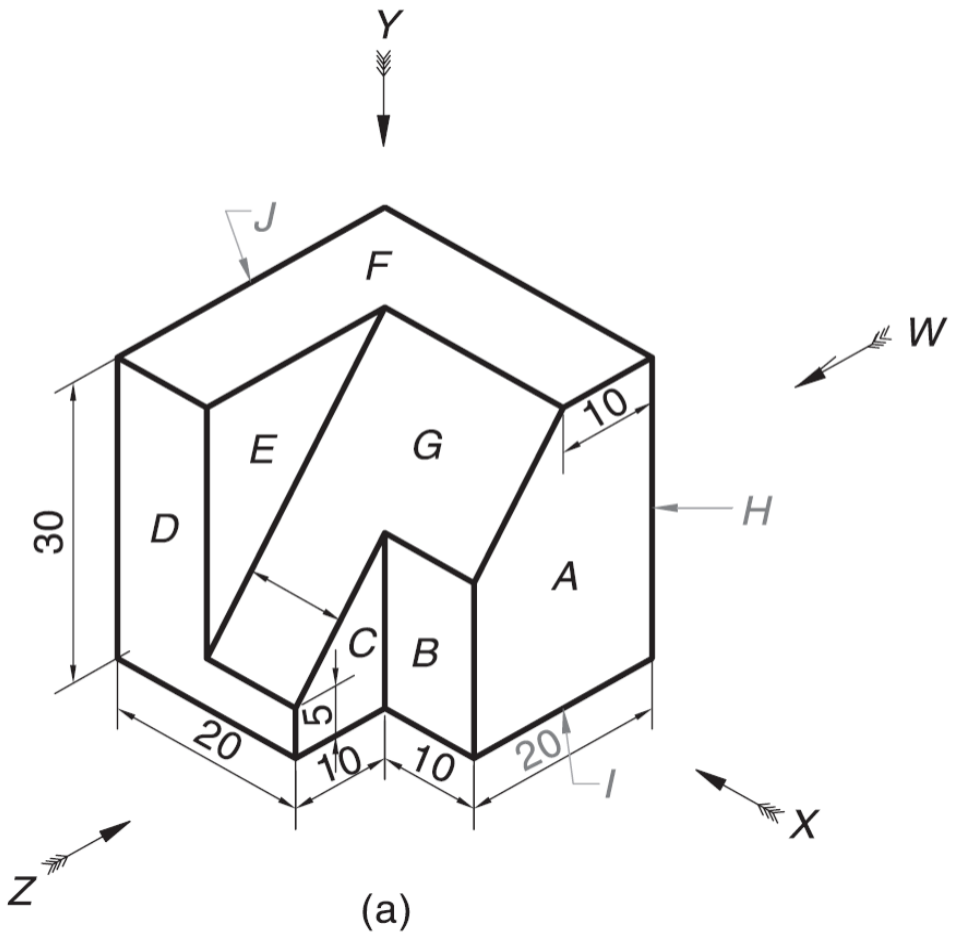
(a) shows a radius dimensioned with the centre of the radius located on the drawing.

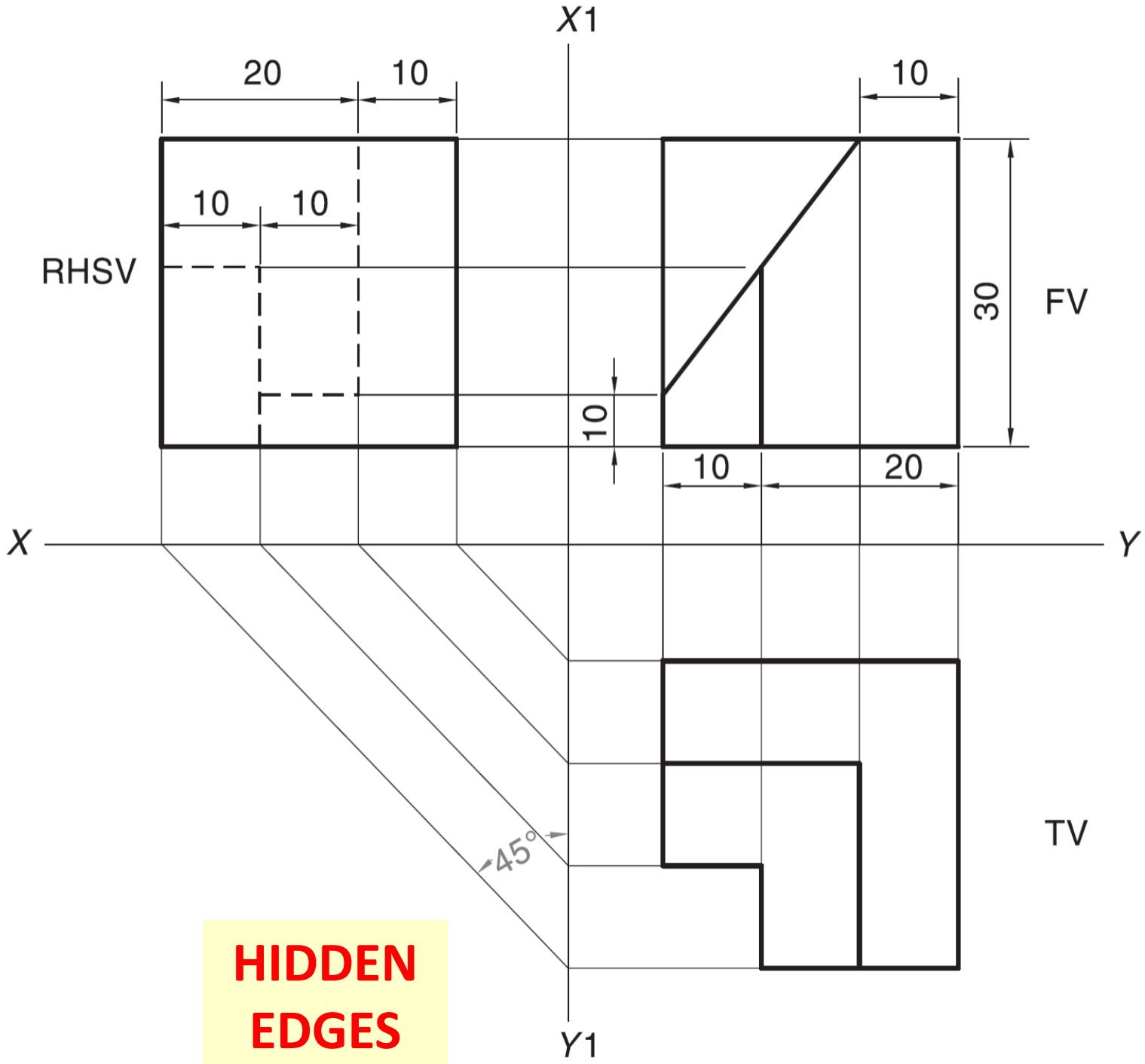
(b) shows how to dimension radii which do not need their centres locating.

LINE STYLES and DIMENSIONING



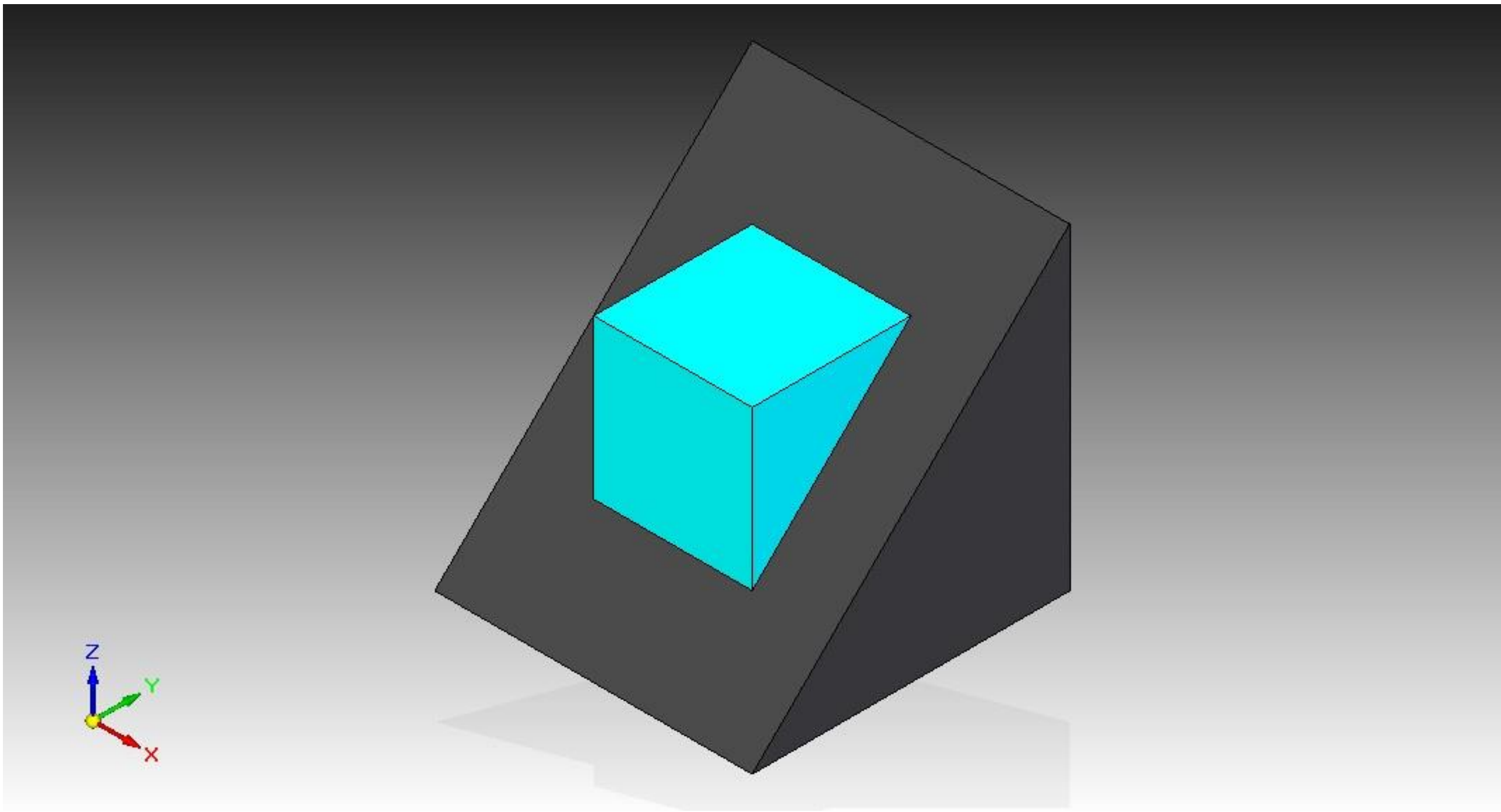


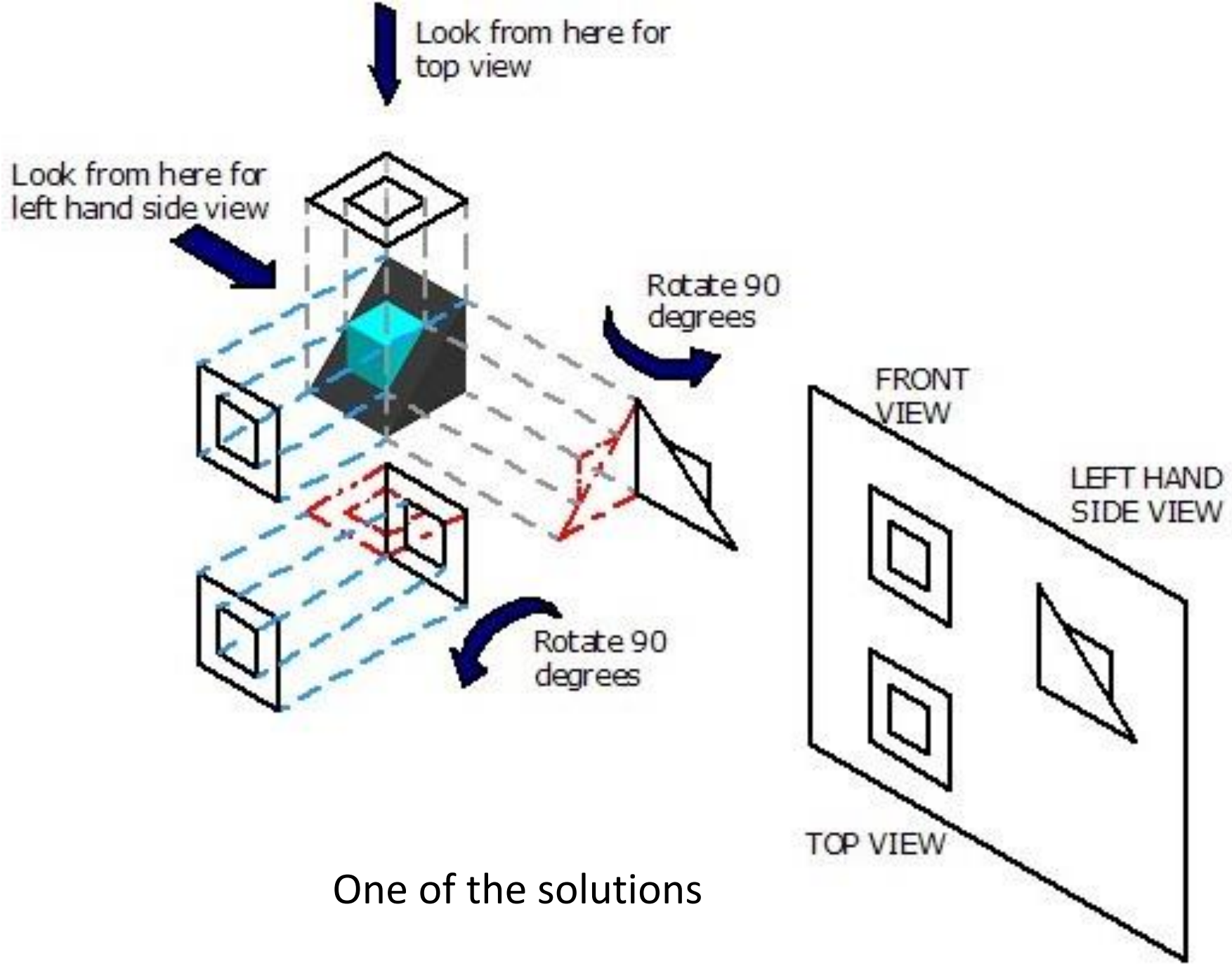




Note the method of dimensioning

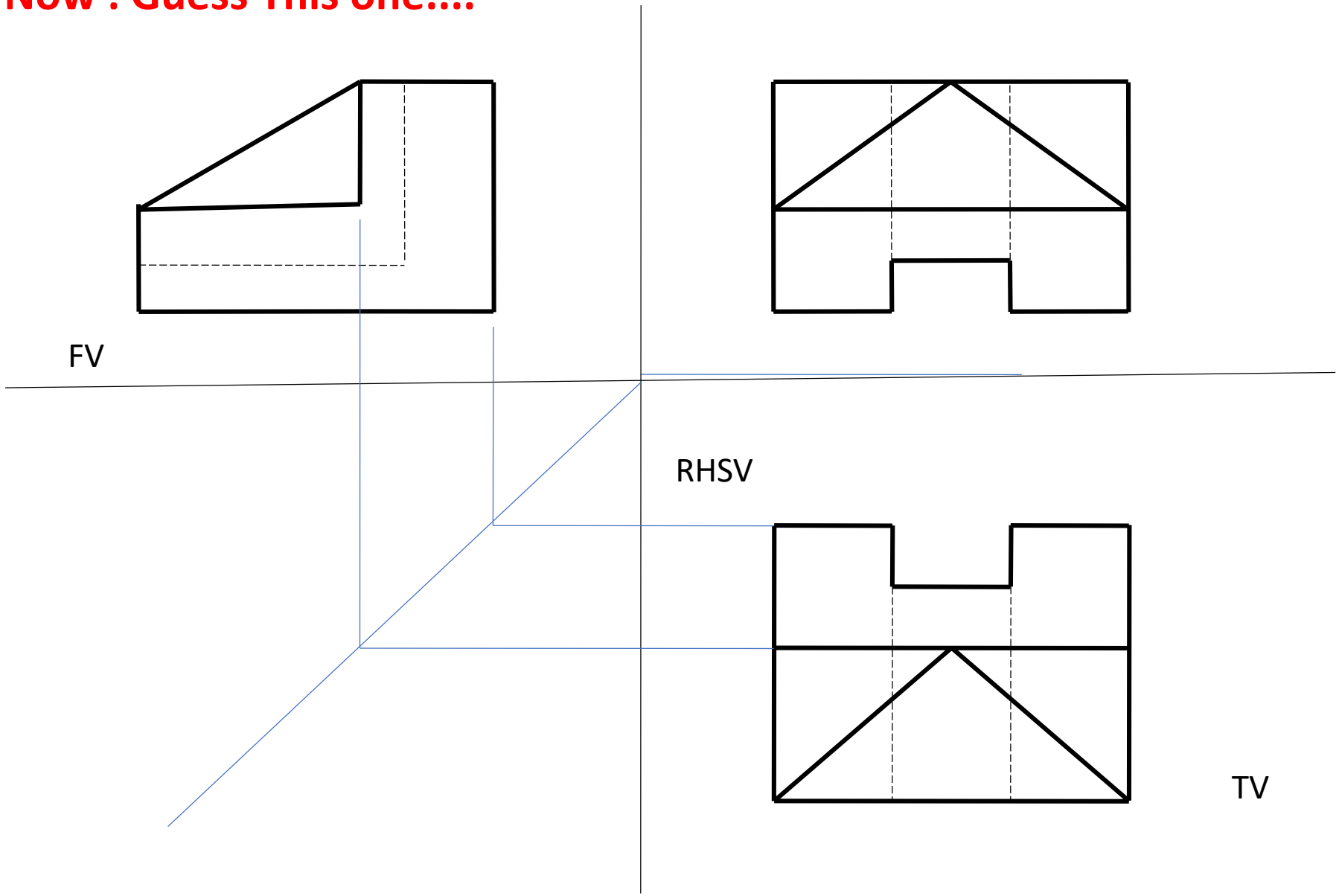
HIDDEN EDGES


Z
Y
X

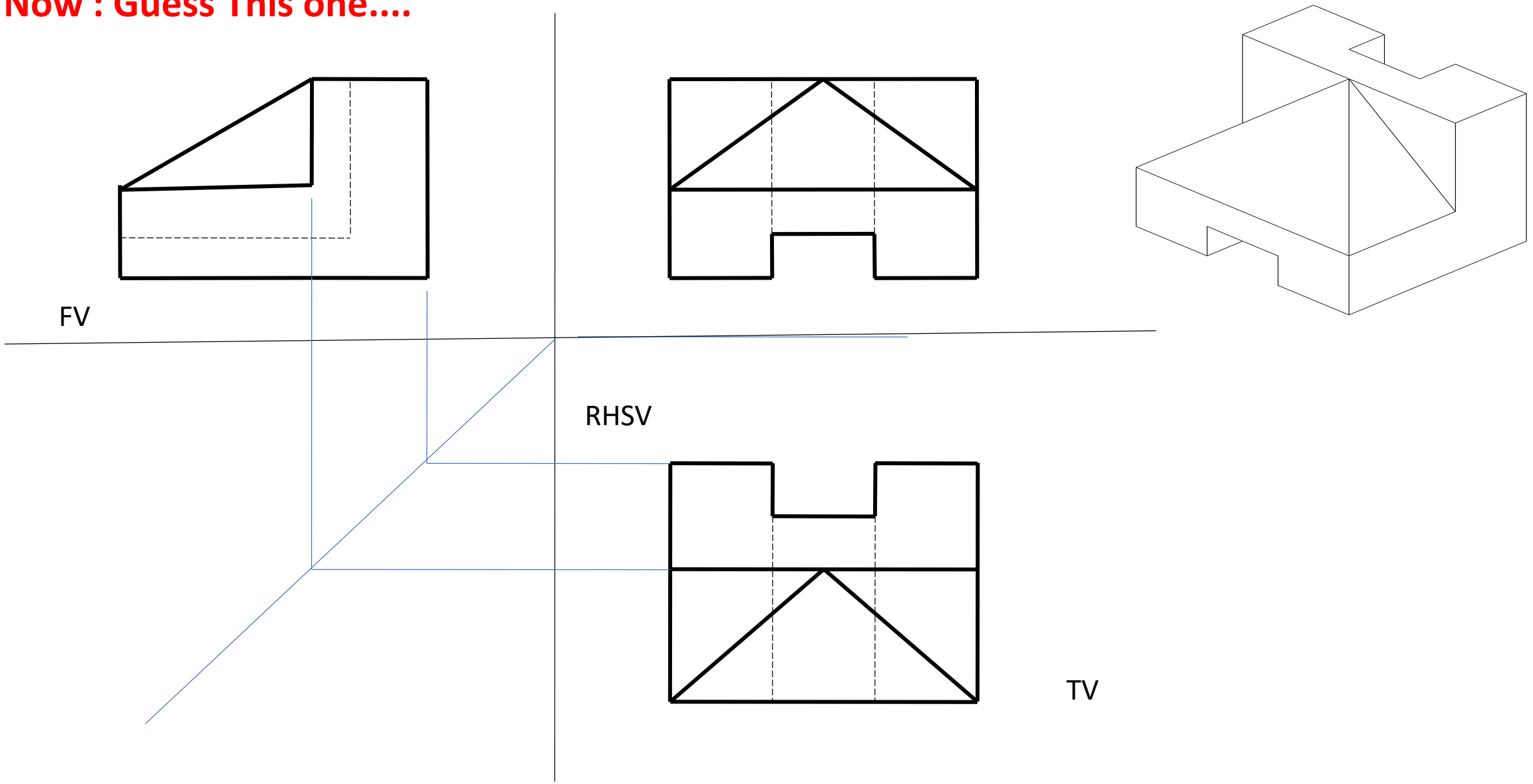


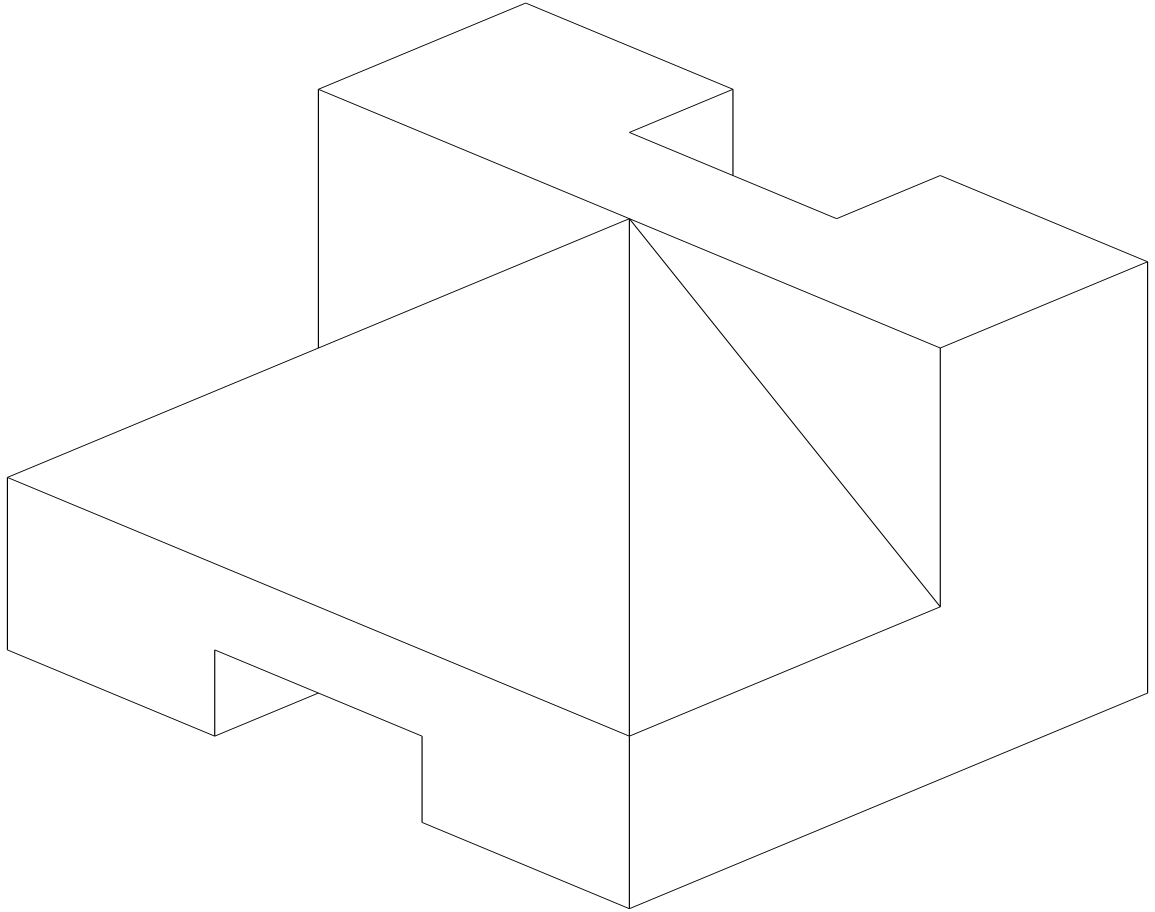
One of the solutions

Now : Guess This one....

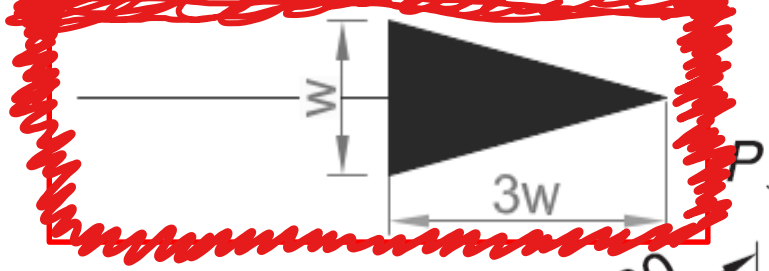


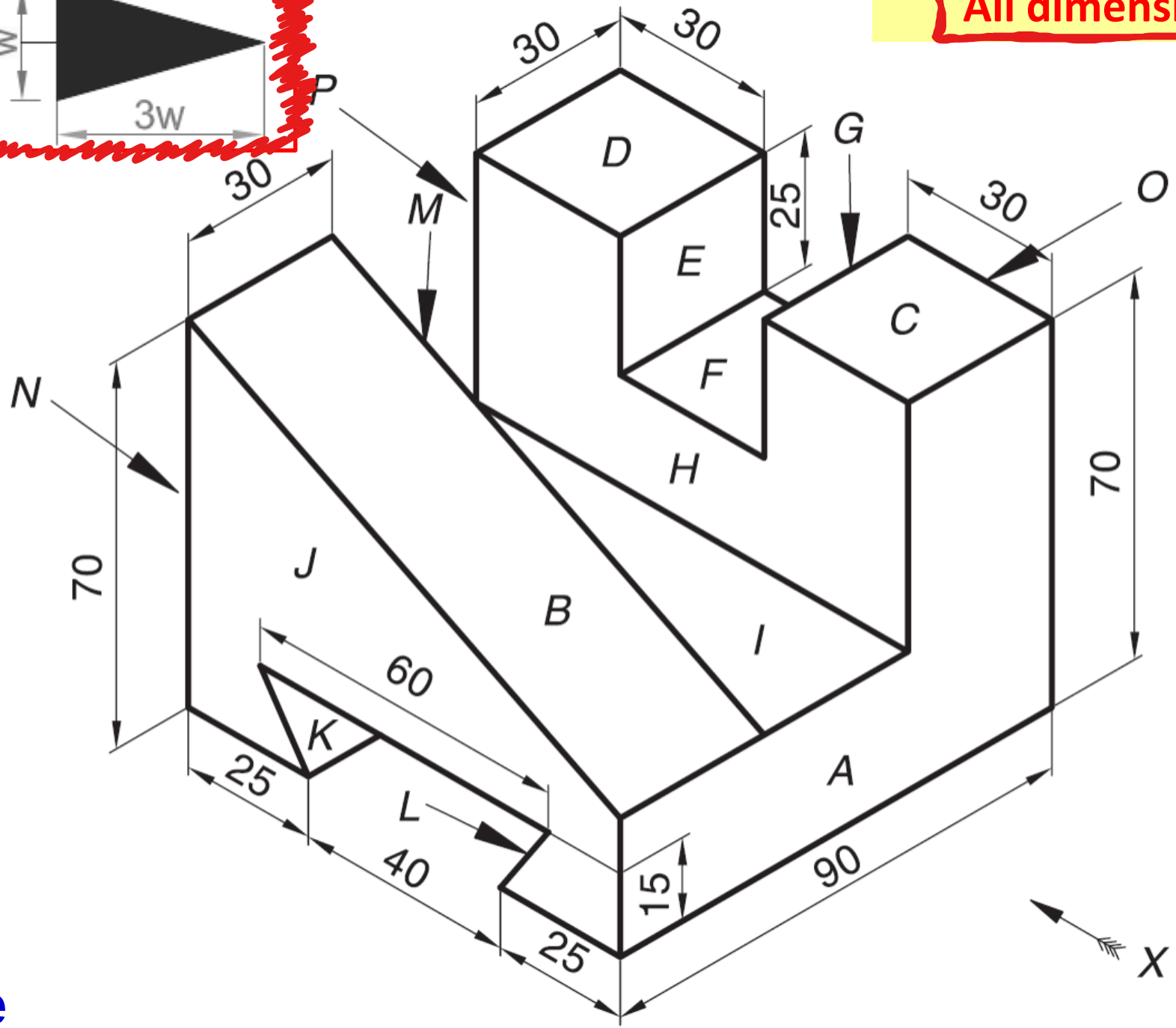
Now : Guess This one....



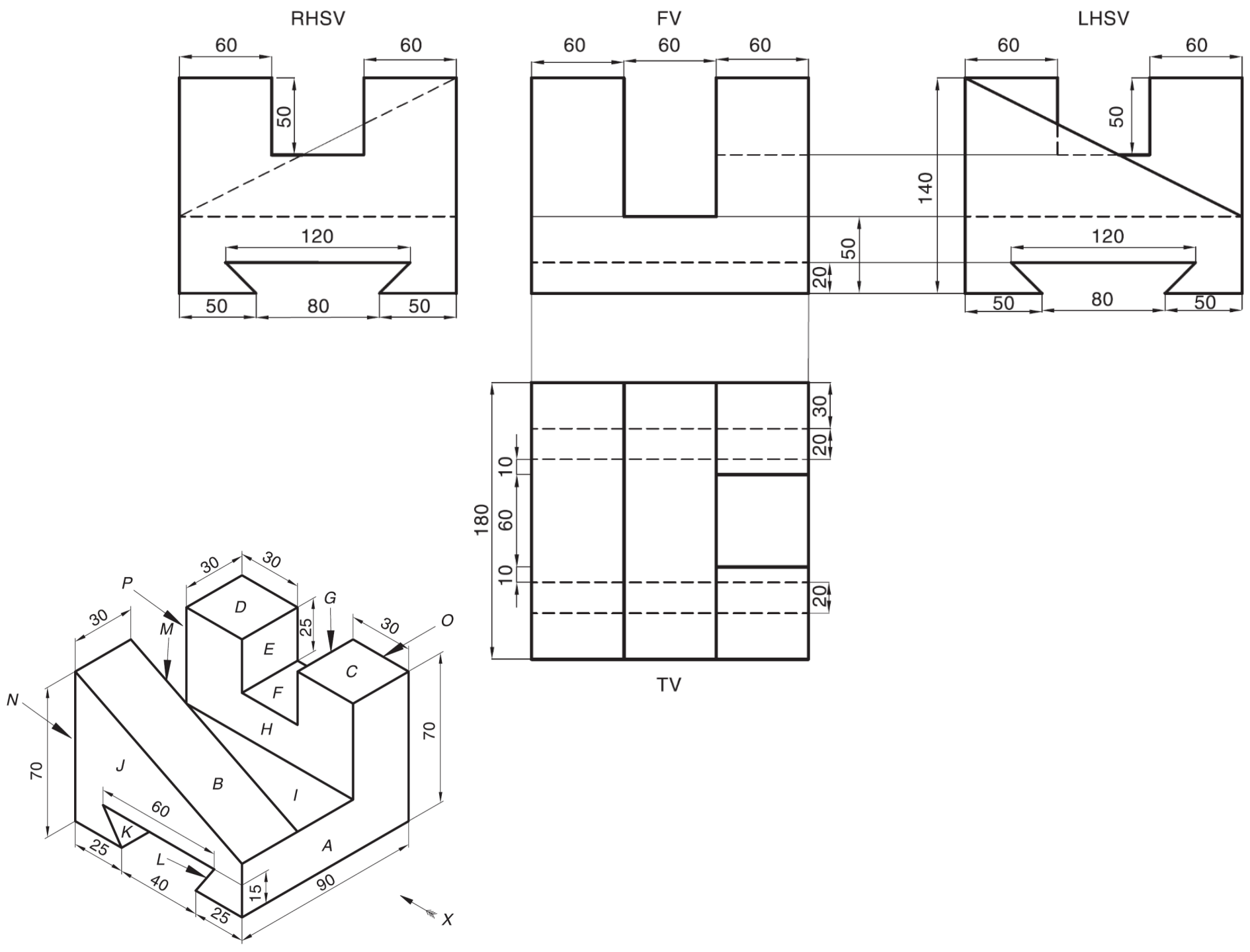


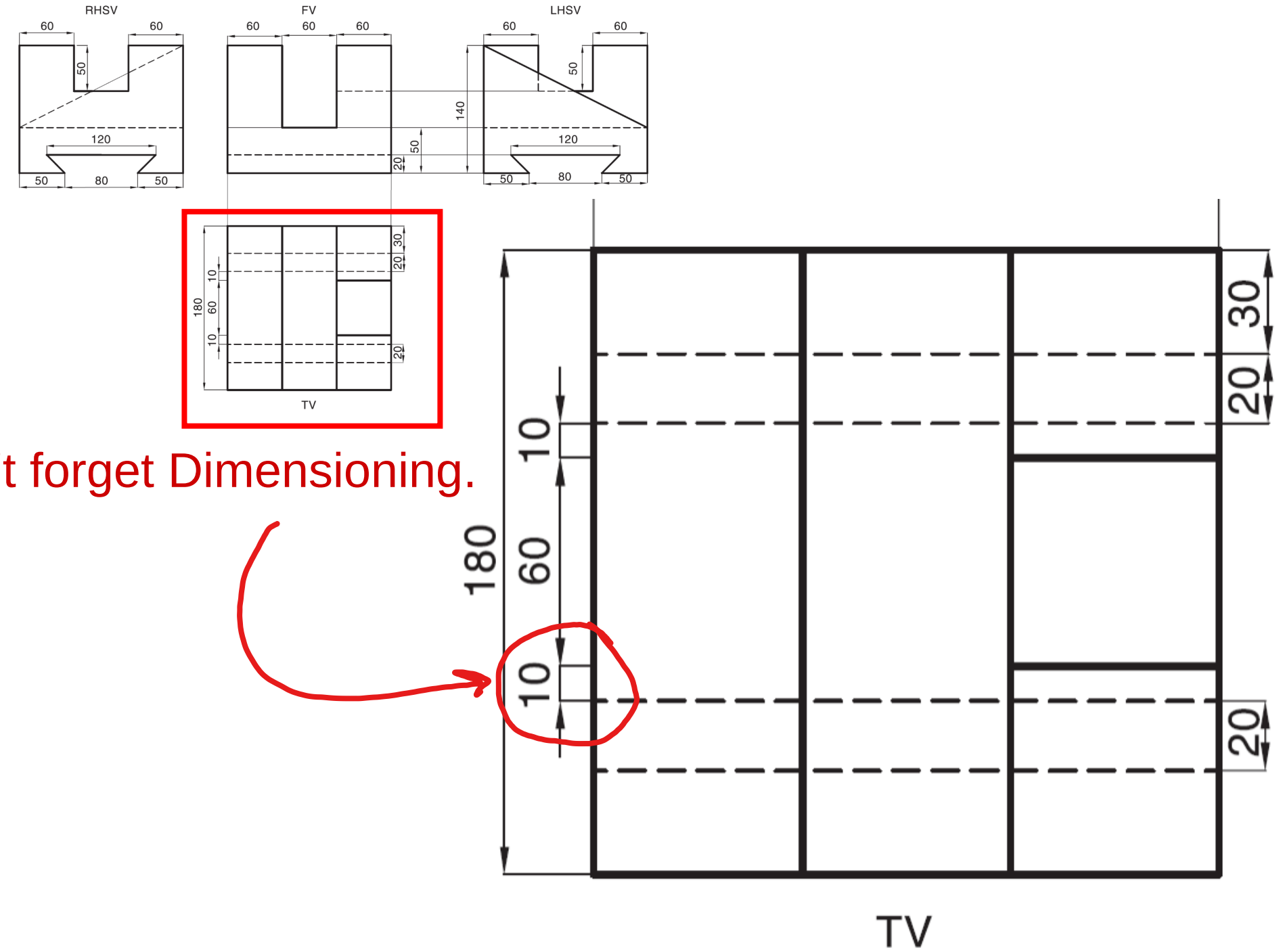
All dimensions in mm

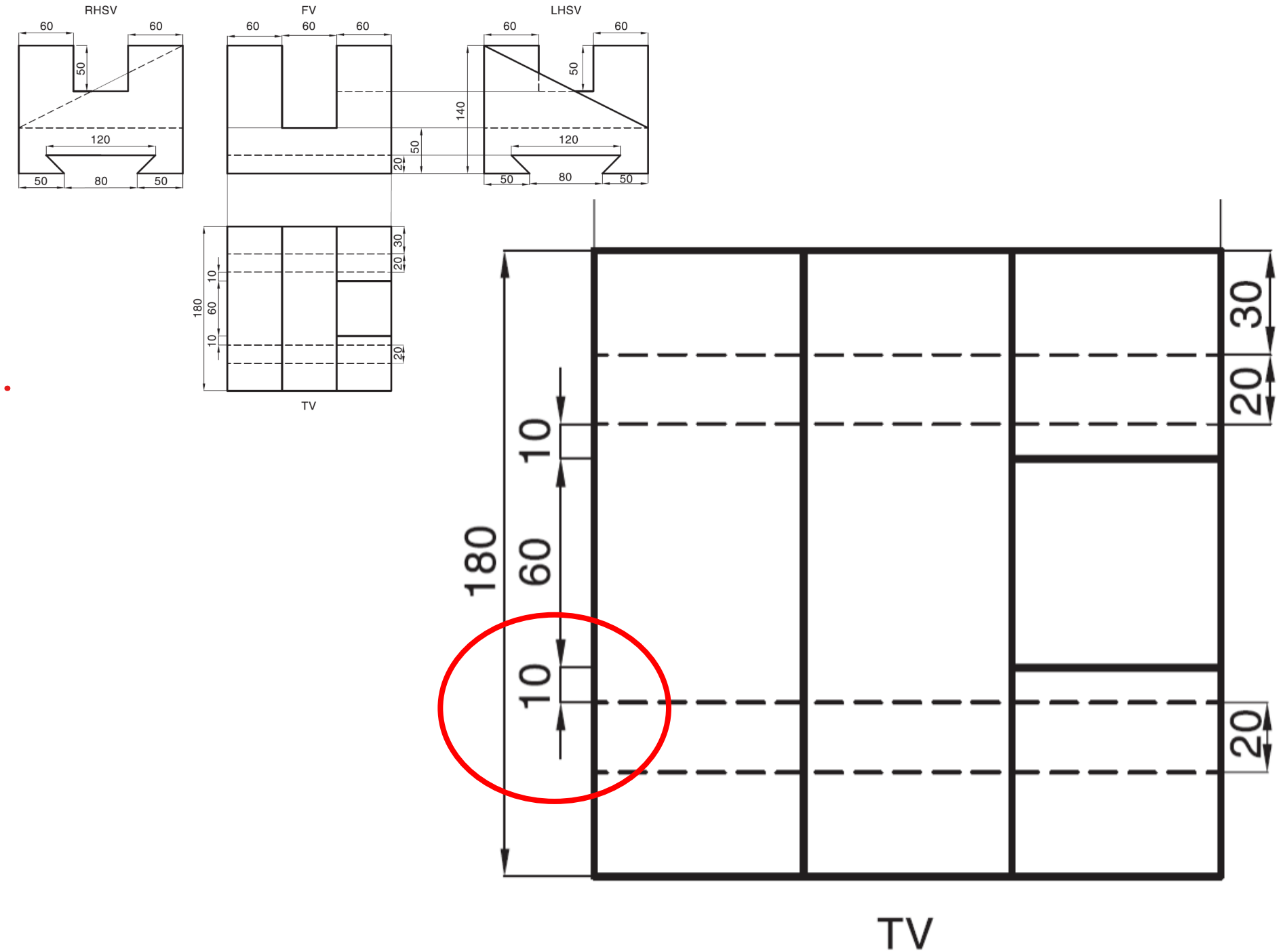




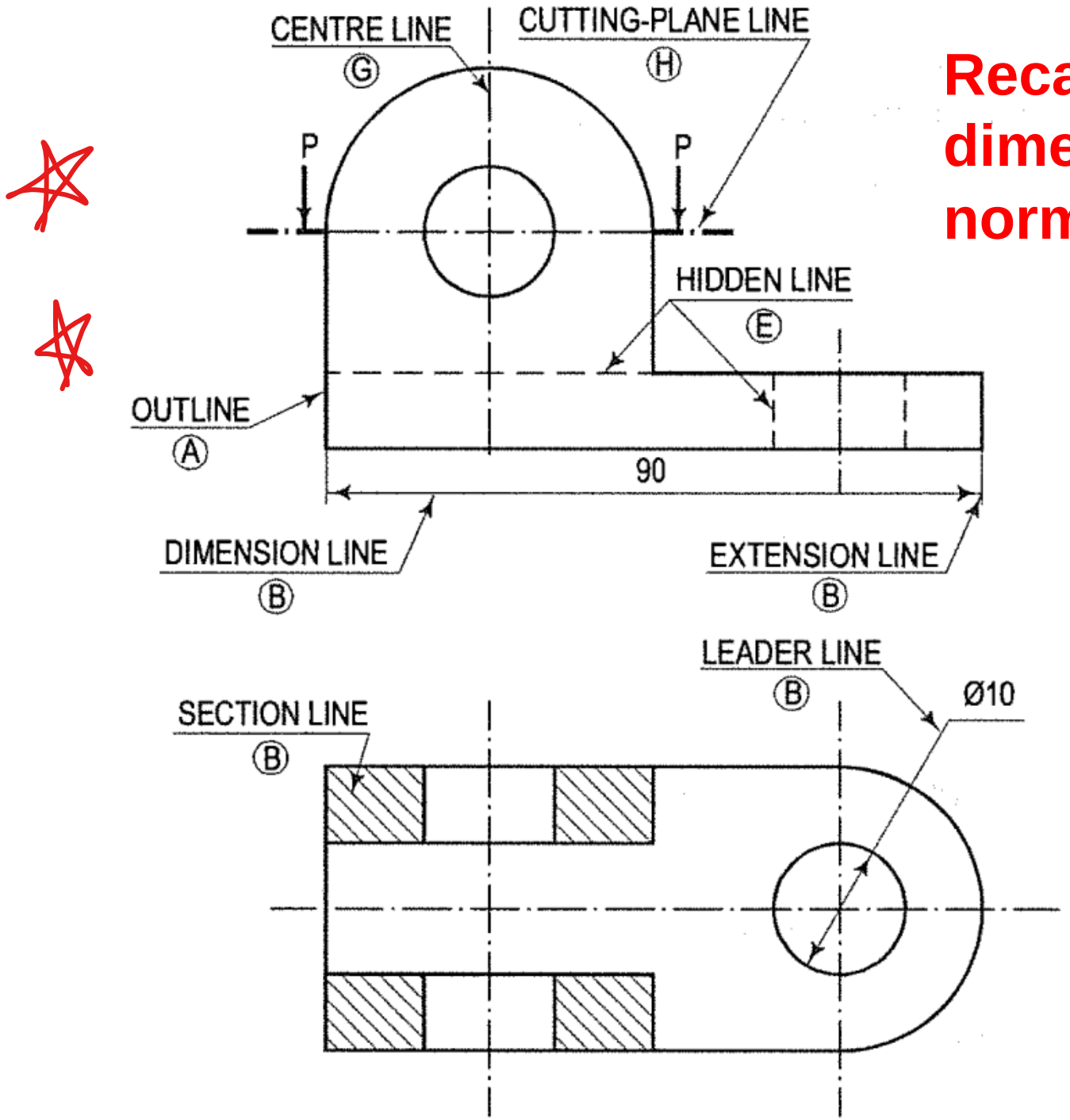
Note the method of dimensioning and arrow style

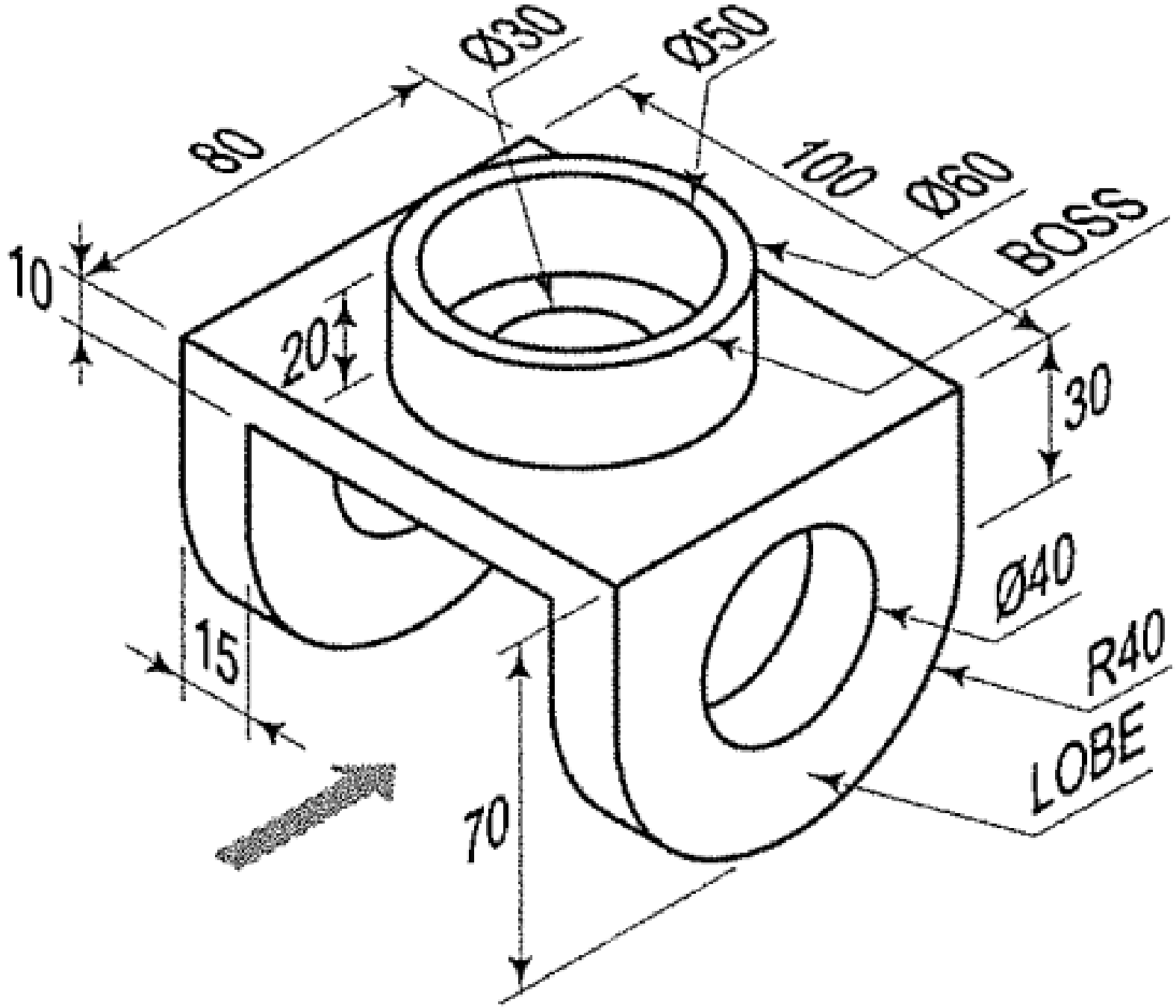

RHSV
FV
LHSV
60
60
50
120
50
80
50
140
20
TV
180
10
60
10
30
20
20
P
M
G
O
N
D
E
F
C
H
J
B
I
K
L
A
25
30
30
30
25
60
40
15
90
70
70
X

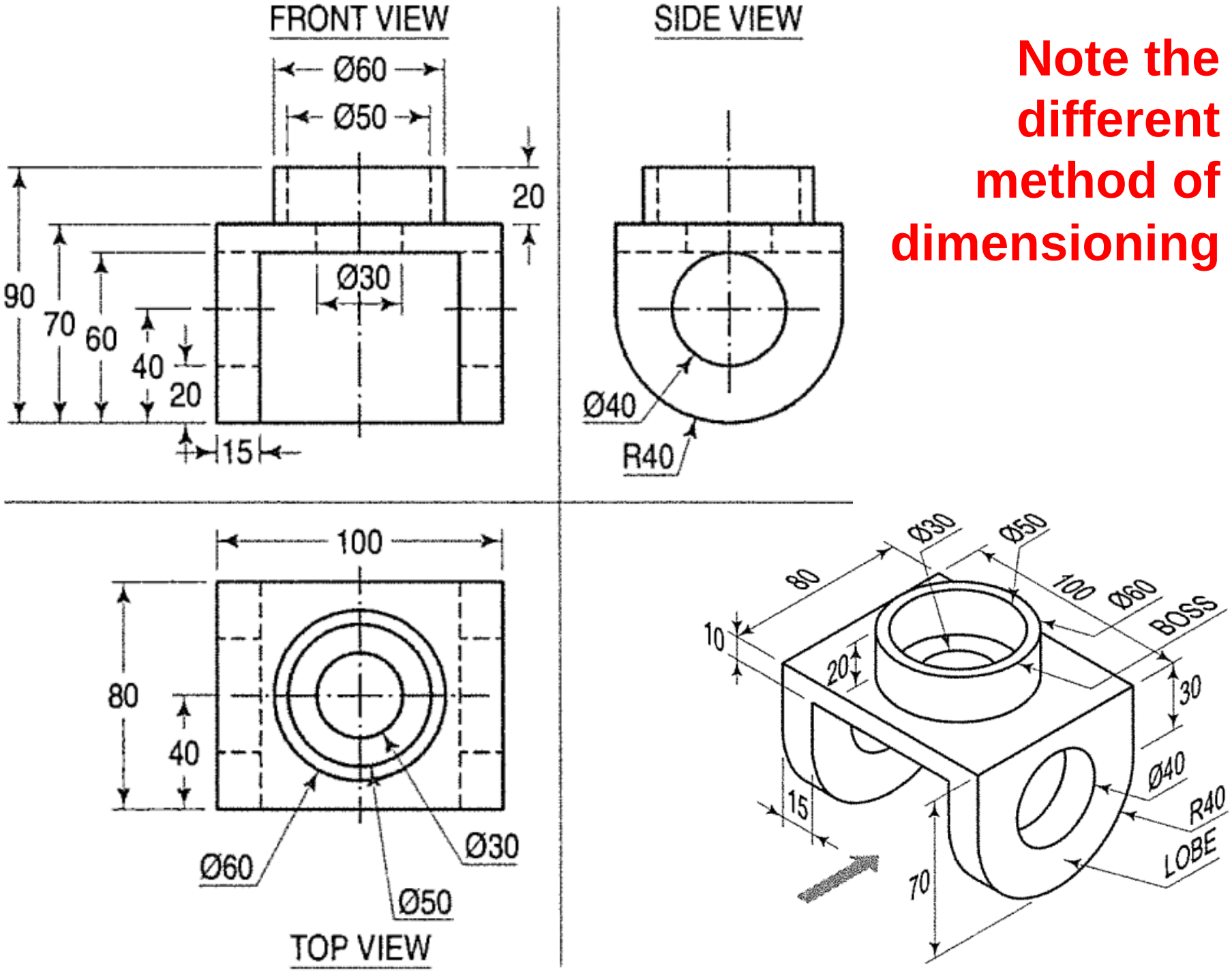

RHSV
FV
LHSV
60
50
120
50
80
140
20
TV
180
10
30
Don't forget Dimensioning.


RHSV
FV
LHSV
60
60
50
120
50
80
50
140
20
30
10
180
TV

Recall dimensioning norms




Ø30
Ø50
80
100
Ø60
BOSS
10
20
30
Ø40
R40
15
LOBE
70


FRONT VIEW
SIDE VIEW
TOP VIEW
Ø60
Ø50
Ø30
20
90
70
60
40
20
15
Ø40
R40
100
80
40
Ø60
Ø30
Ø50
Note the different method of dimensioning
Ø30
Ø50
80
100
Ø60
BOSS
10
20
30
Ø40
R40
15
LOBE
70

DO NOT USE A MIXTURE OF STYLES WHILE DIMENSIONING