ORTHOGRAPHIC PROJECTIONS

ME111

By

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Orthographic Projections

- Orthographic Projections is a technical drawing in which different views of an object are projected on different reference planes observing perpendicular to respective reference plane.
- Different Reference planes are;
  - *Horizontal Plane (HP)*
  - *Vertical Plane (VP)*
  - *Side or Profile Plane (PP)*
- Different views are;
  - *Front View (FV) – Projected on VP*
  - *Top View (TV) – Projected on HP*
  - *Side View (SV) – Projected on PP*

NOTATIONS

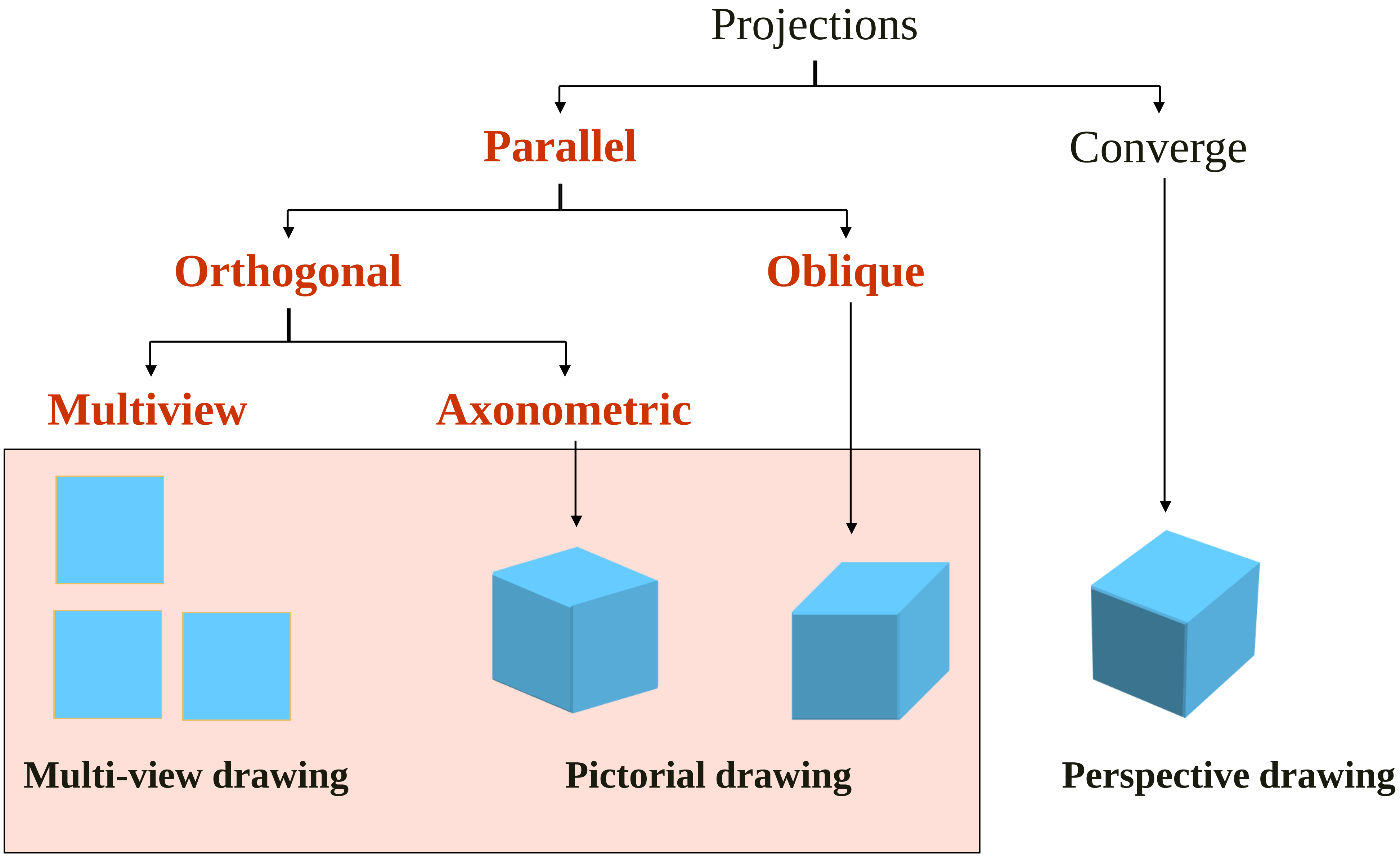
Following notations should be followed while naming Different views in orthographic projections.

OBJECT	POINT A	LINE AB
IT'S TOP VIEW	a	a b
IT'S FRONT VIEW	a´	a´ b´
IT'S SIDE VIEW	a´´	a´´ b´´

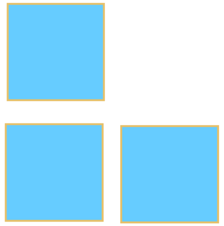
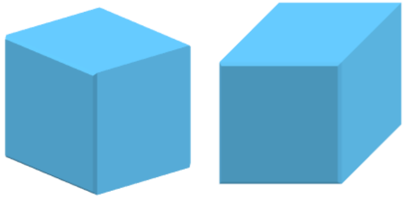
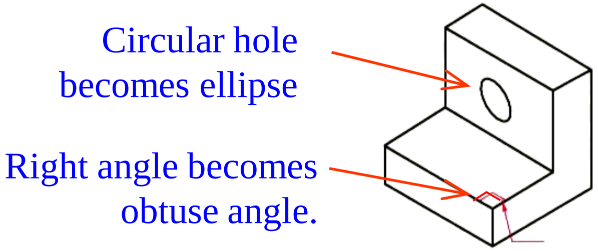
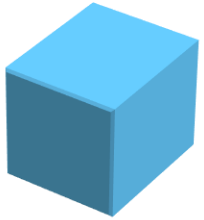
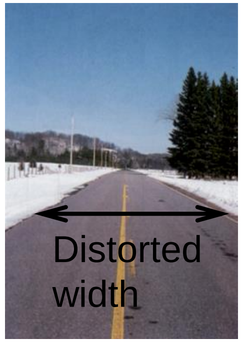
Same system of notations should be followed incase numbers, like 1, 2, 3 – are used.

TERMS 'ABOVE' & 'BELOW' WITH RESPECT TO H.P.
AND TERMS 'INFRONT' & 'BEHIND' WITH RESPECT TO V.P.

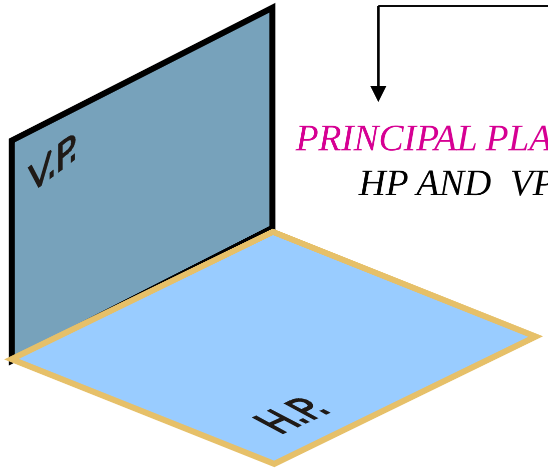
Types of views



View comparison

Type		
Multi-view drawing 	● Accurately presents object's details, i.e. size and shape.	● Require training to visualization.
Pictorial drawing 	● Easy to visualize.	● Shape and angle distortion 
Perspective drawing 	● Object looks more like what our eyes perceive.	● Difficult to create ● Size and shape distortion 

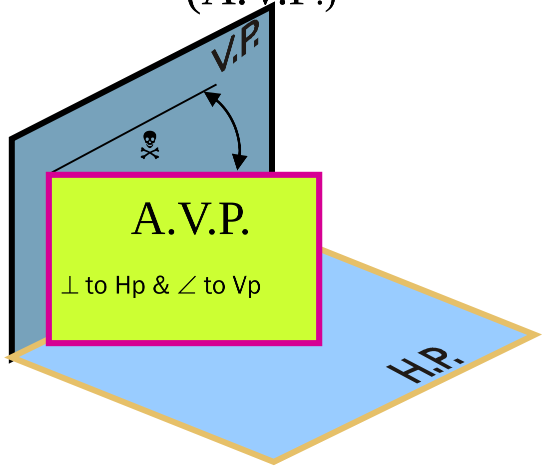
PLANES



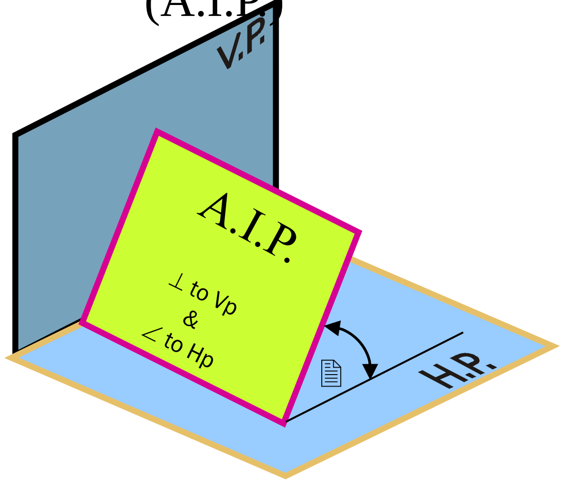
PRINCIPAL PLANES
HP AND VP

AUXILIARY PLANES

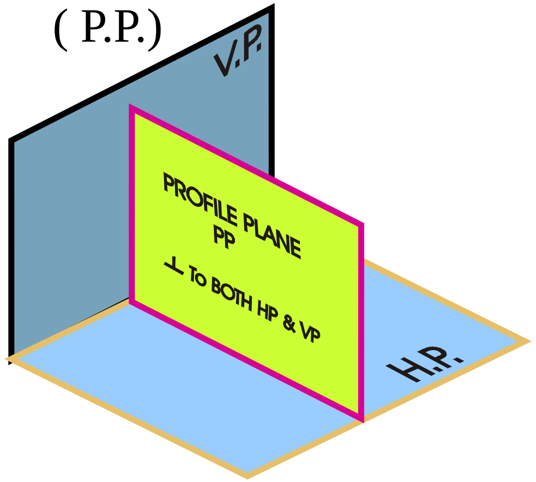
Auxiliary Vertical Plane
(A.V.P.)



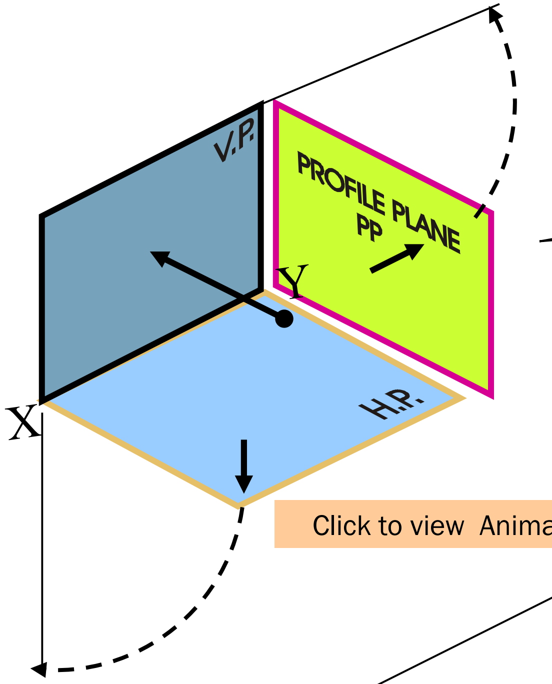
Auxiliary Inclined Plane
(A.I.P.)



Profile Plane
(P.P.)



PATTERN OF PLANES & VIEWS (First Angle Method)



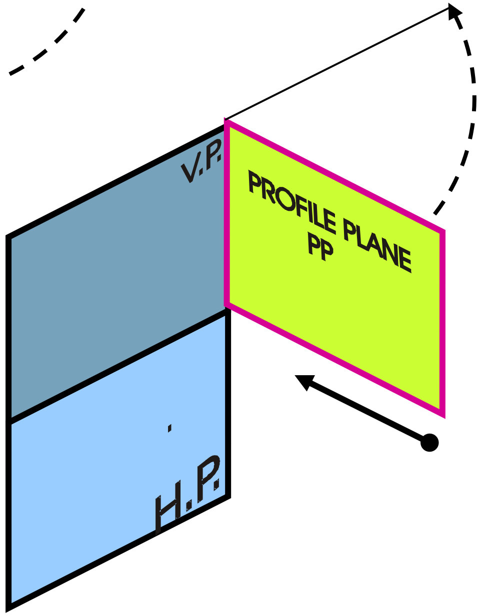
THIS IS A PICTORIAL SET-UP OF ALL THREE PLANES.
ARROW DIRECTION IS A NORMAL WAY OF OBSERVING THE OBJECT.
BUT IN THIS DIRECTION ONLY VP AND A VIEW ON IT (FV) CAN BE SEEN.
THE OTHER PLANES AND VIEWS ON THOSE CAN NOT BE SEEN.

PROCEDURE TO SOLVE ABOVE PROBLEM:-

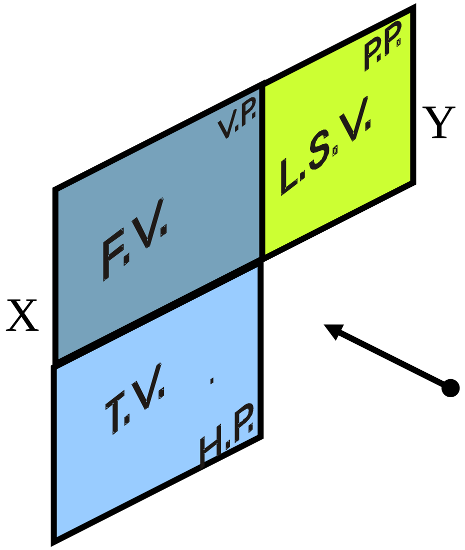
TO MAKE THOSE PLANES ALSO VISIBLE FROM THE ARROW DIRECTION,
A) HP IS ROTATED 90^0 DOUNWARD
B) PP, 90^0 IN RIGHT SIDE DIRECTION.
THIS WAY BOTH PLANES ARE BROUGHT IN THE SAME PLANE CONTAINING VP.

Click to view Animation

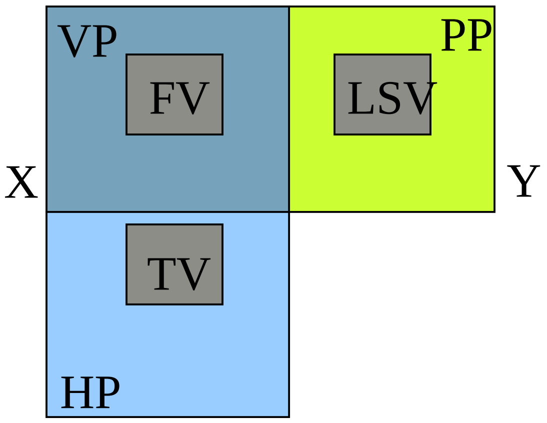
On clicking the button if a warning comes please click YES to continue, this program is safe for your pc.



HP IS ROTATED DOWNWARD 90^0
AND
BROUGHT IN THE PLANE OF VP.



PP IS ROTATED IN RIGHT SIDE 90^0
AND
BROUGHT IN THE PLANE OF VP.

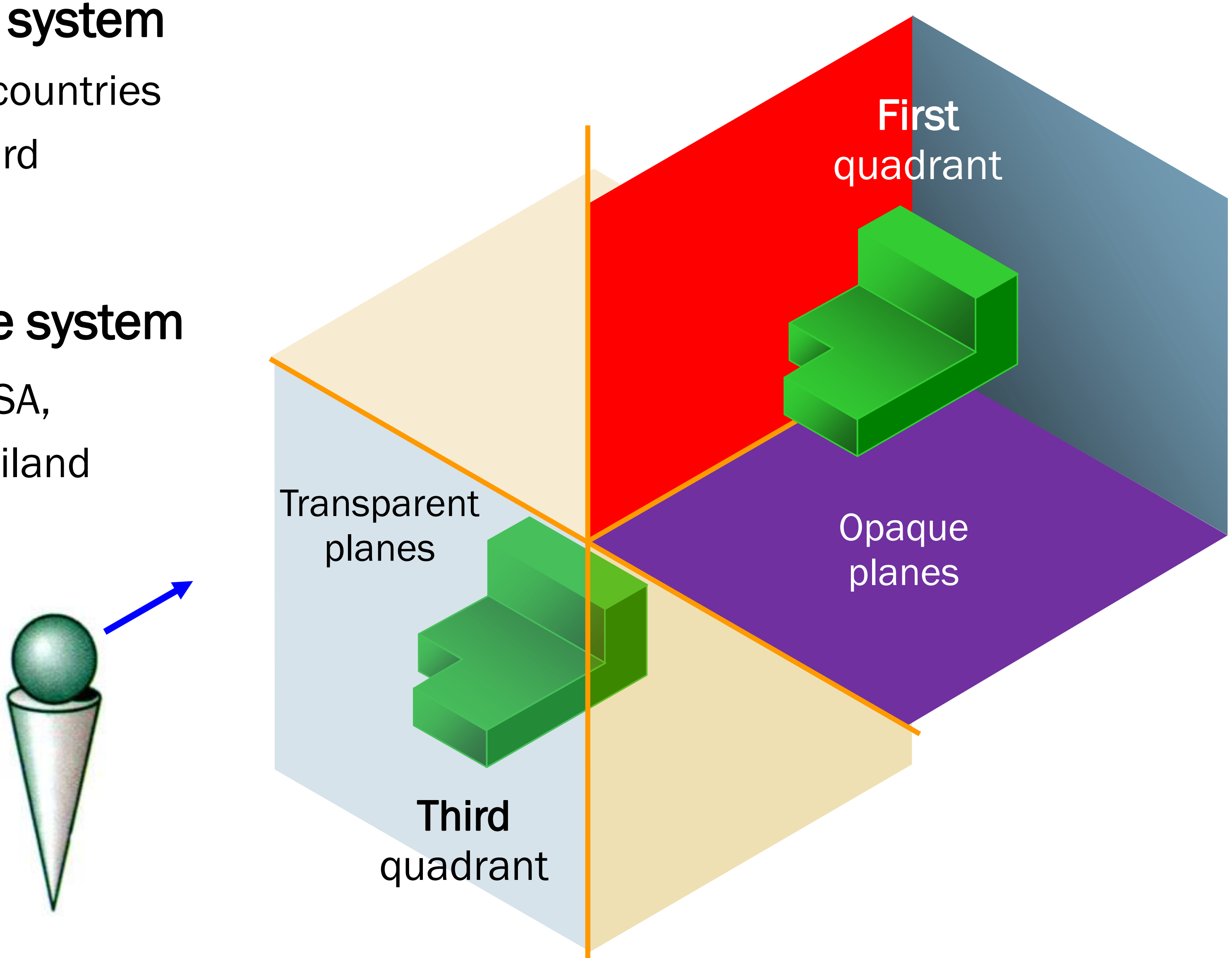


ACTUAL PATTERN OF PLANES & VIEWS
OF ORTHOGRAPHIC PROJECTIONS
DRAWN IN
FIRST ANGLE METHOD OF PROJECTIONS

Projection systems

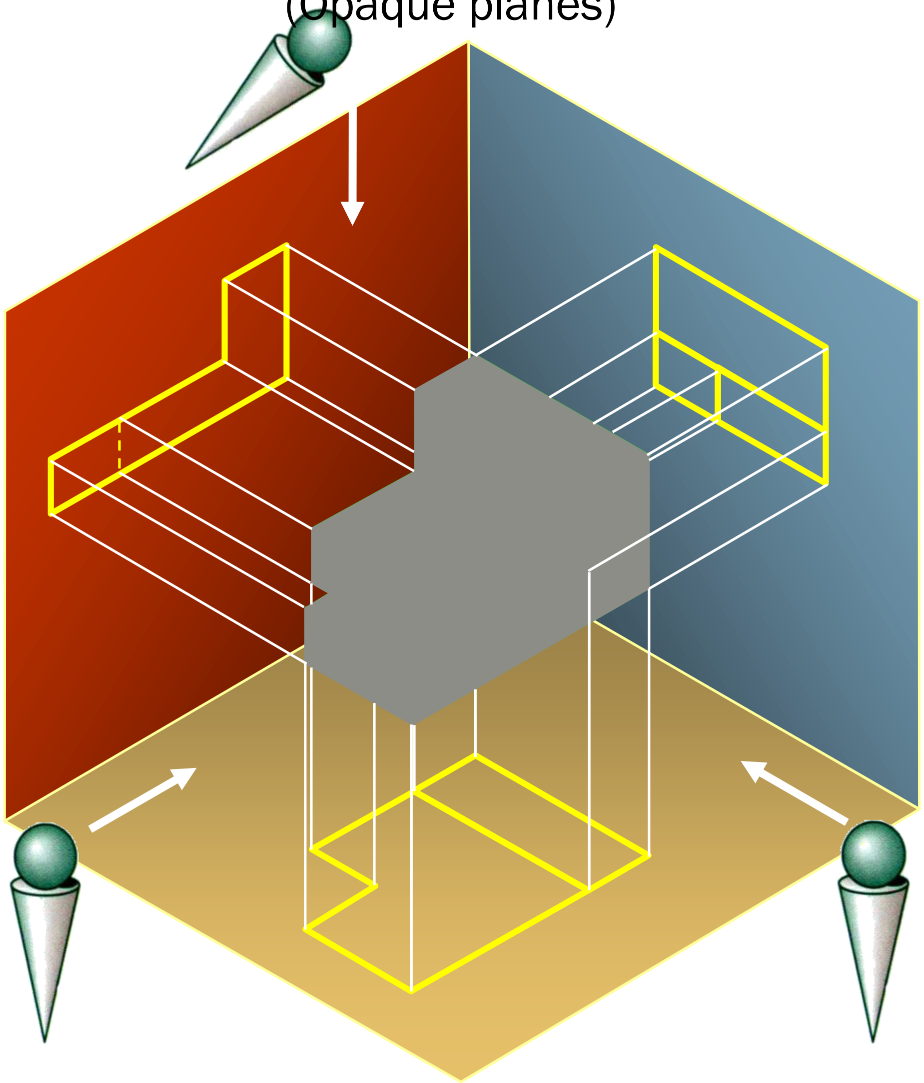
1. First angle system
   - European countries
   - ISO standard

2. Third angle system
   - Canada, USA, Japan, Thailand

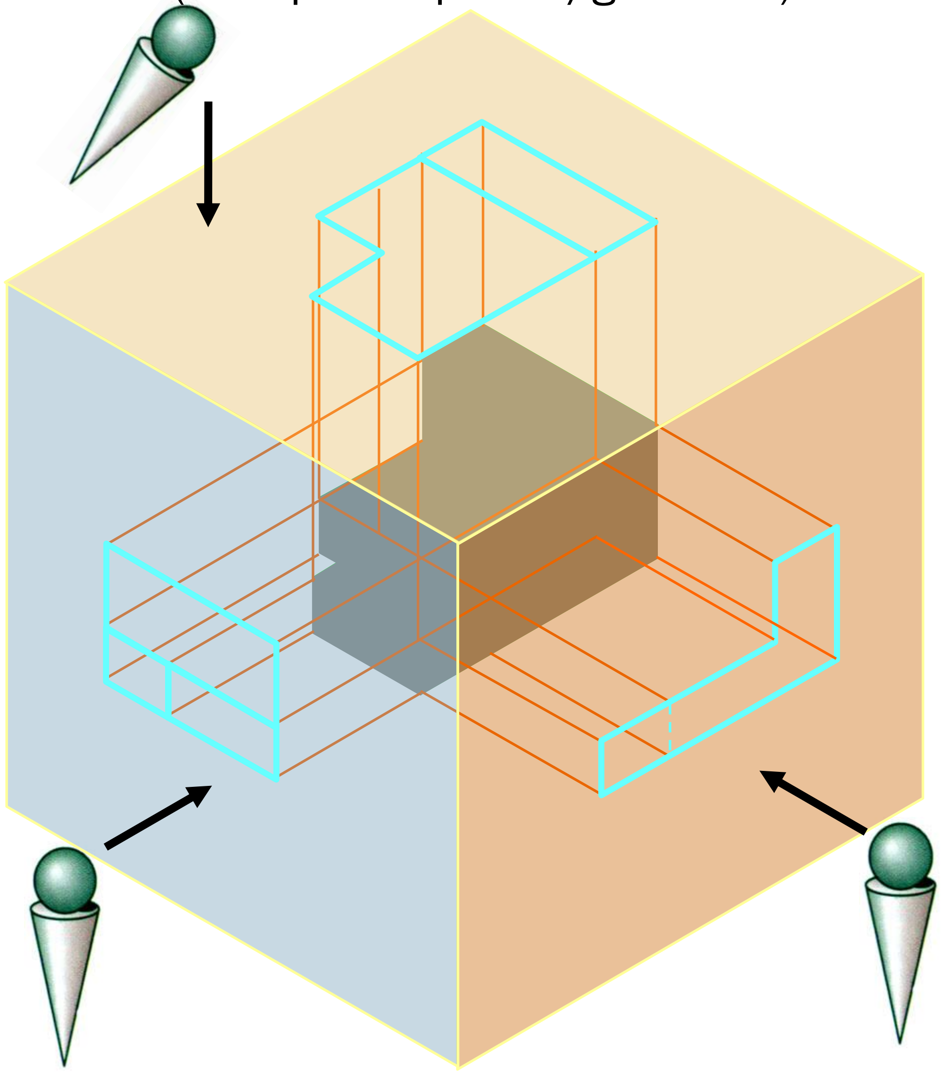


Orthographic views

1st angle system
(Opaque planes)

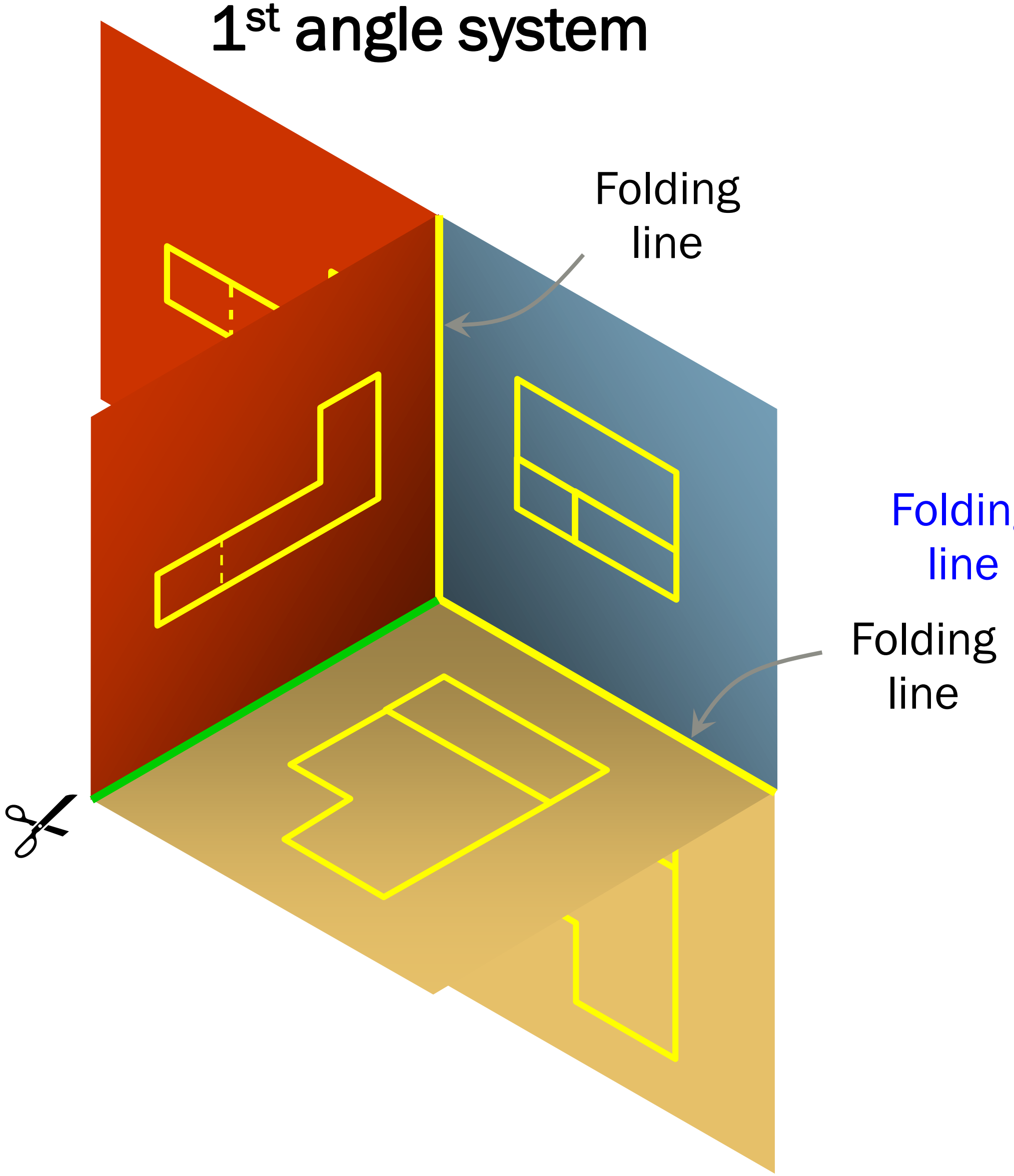


3rd angle system
(transparent planes/glass box)

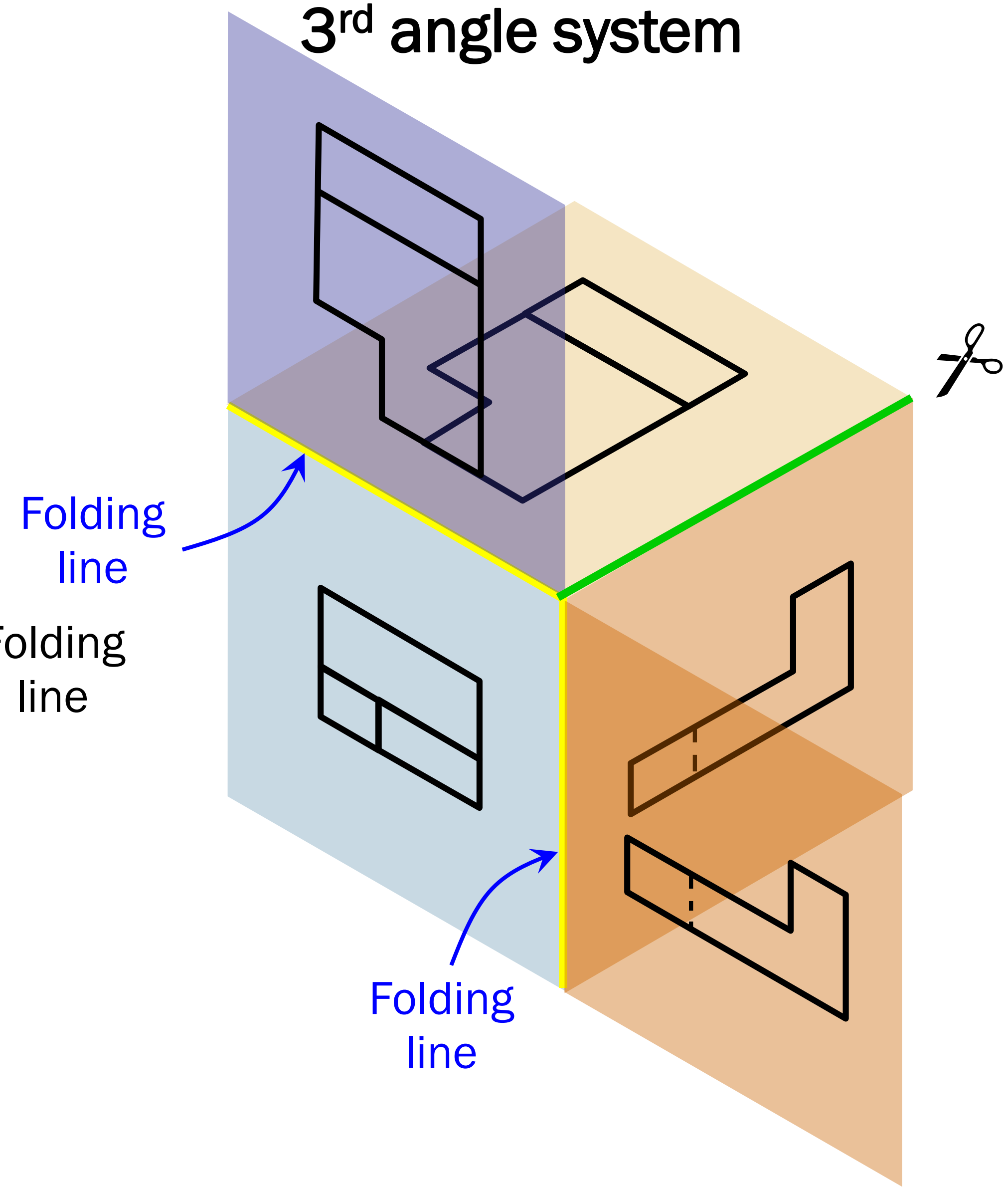


Orthographic views

1st angle system

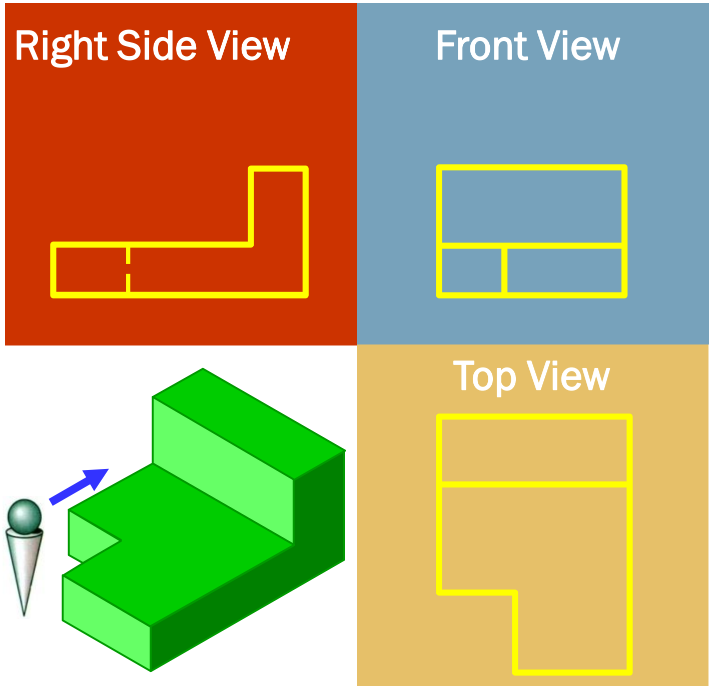


3rd angle system

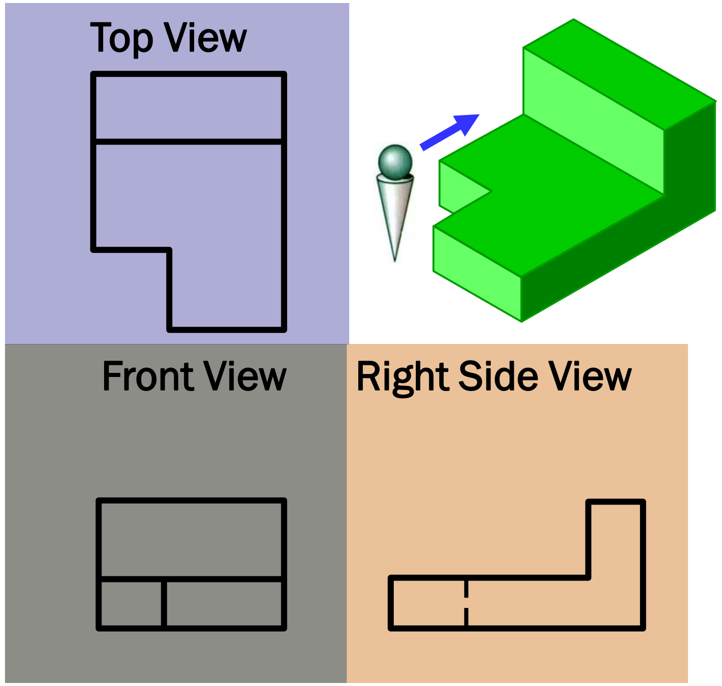


Views arrangement

1st angle system

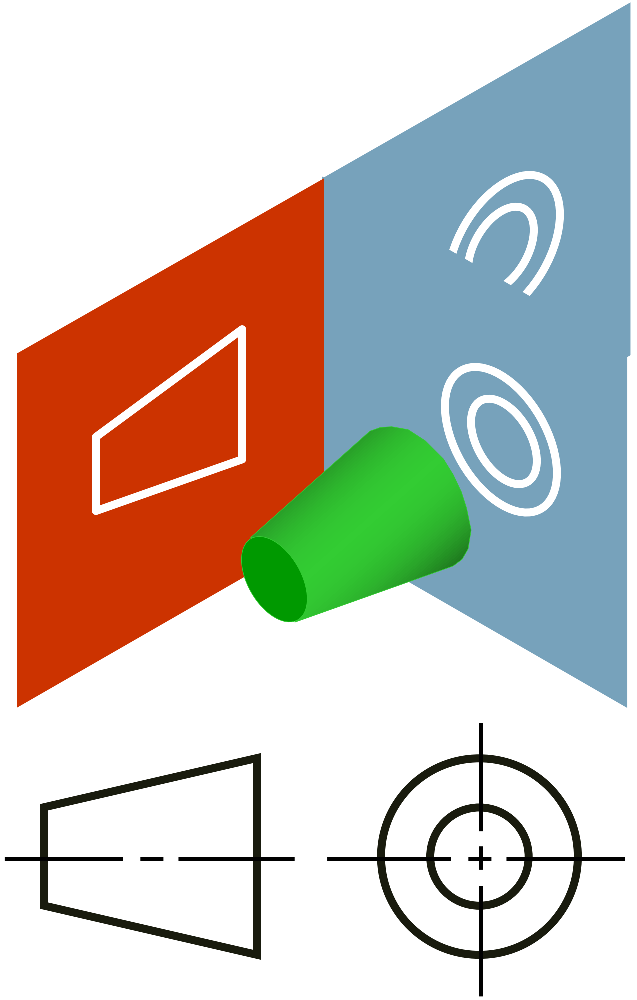


3rd angle system

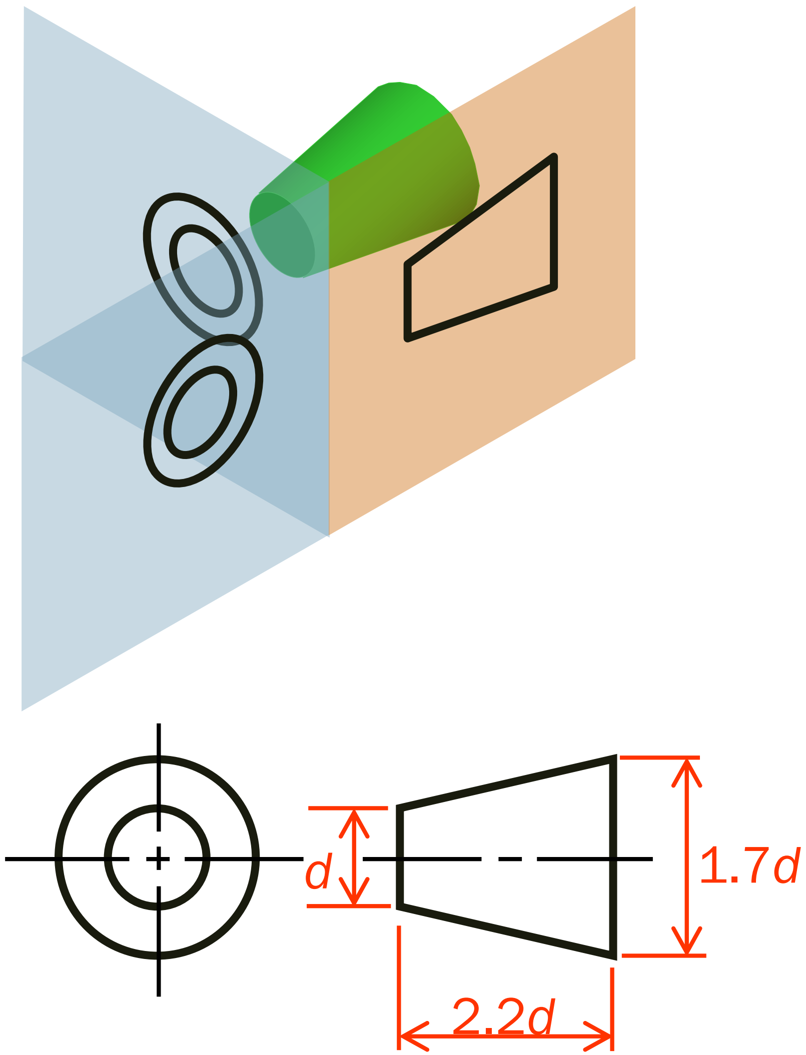


Projection symbols

1st angle system



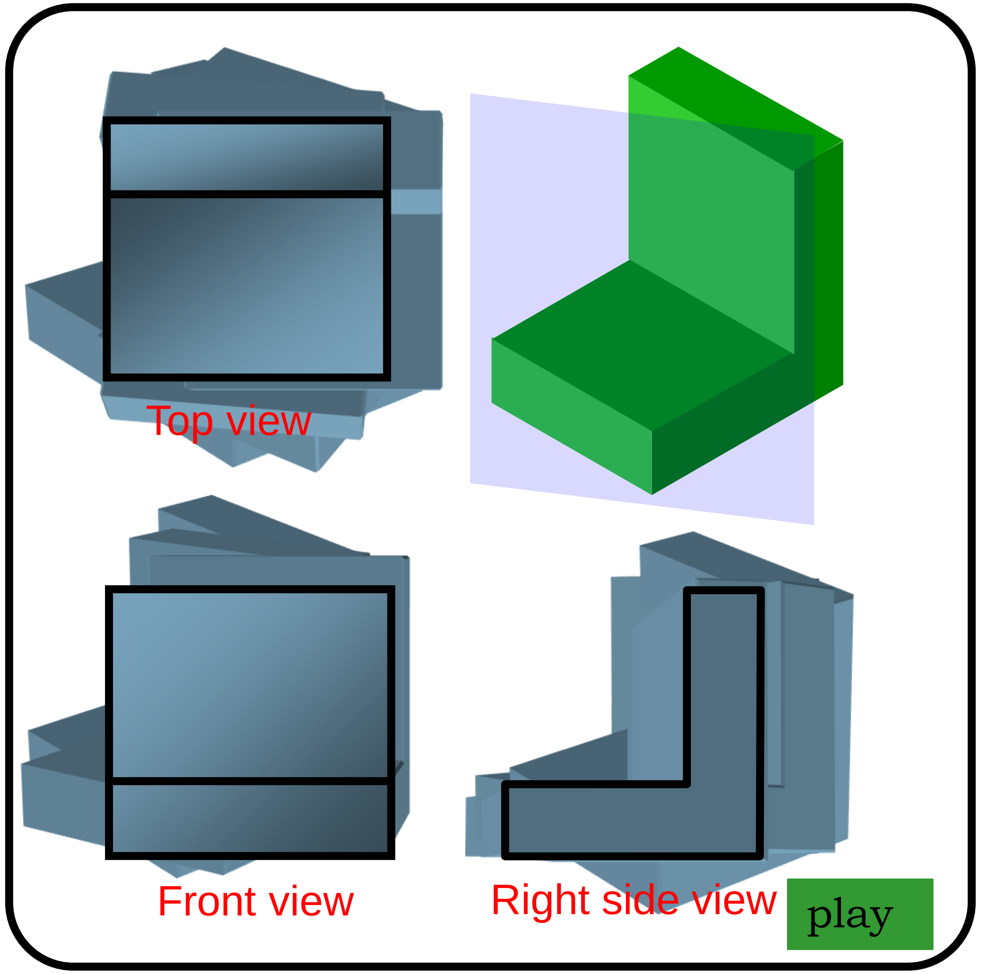
3rd angle system

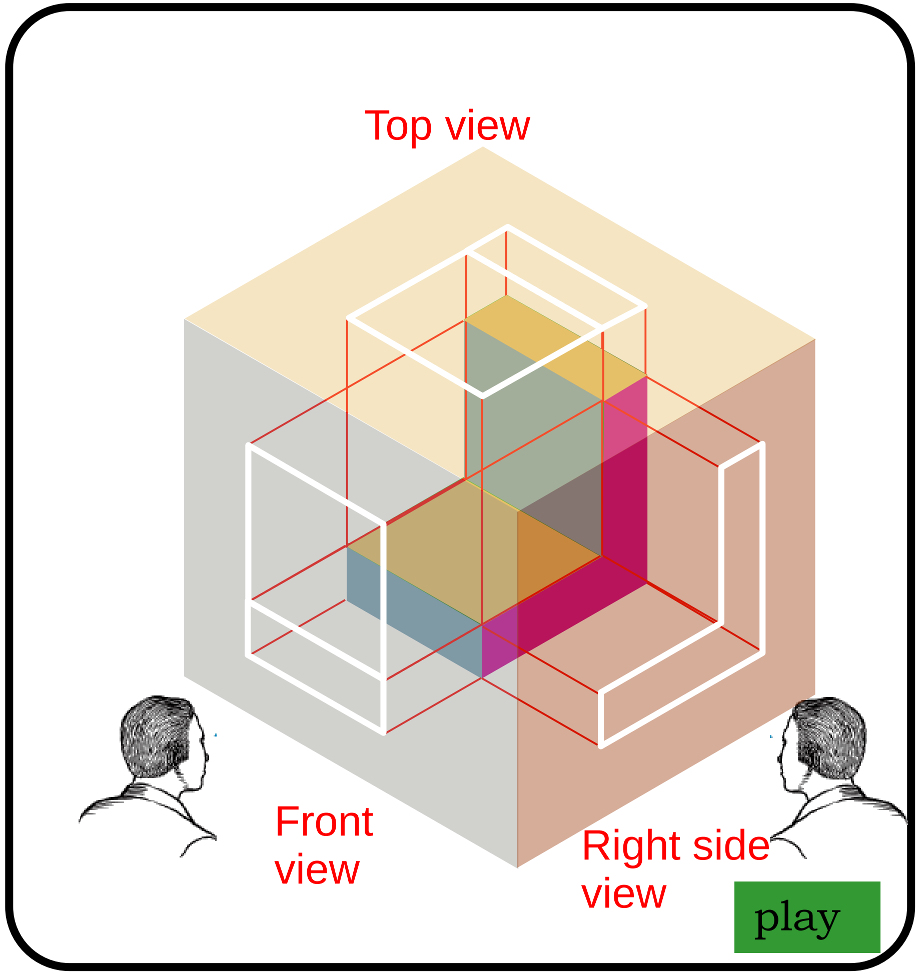


Methods of Orthogonal Projection

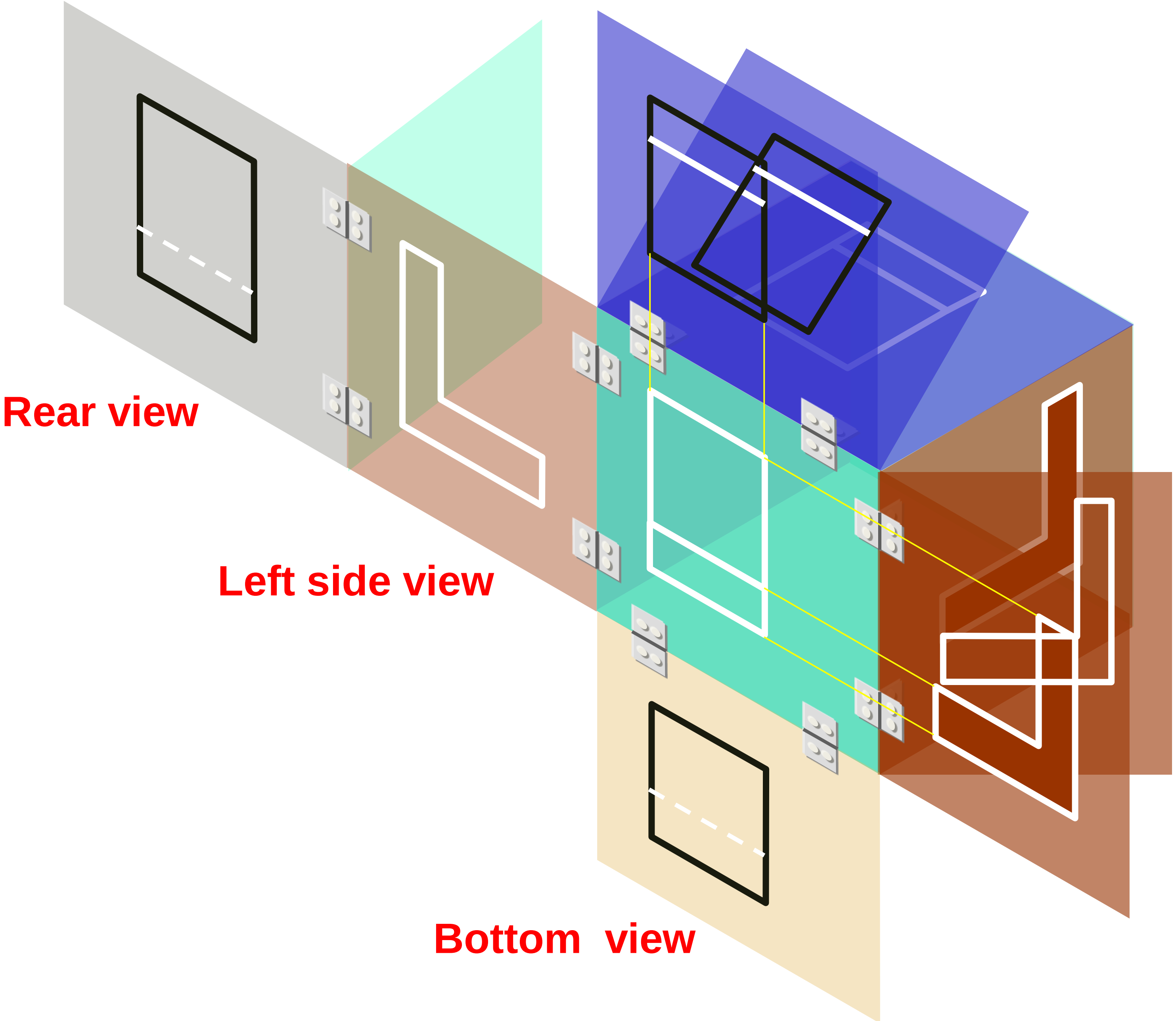
1. Natural Method: Revolve the object with respect to observer

2. Glass box method: The observer moves around the object.

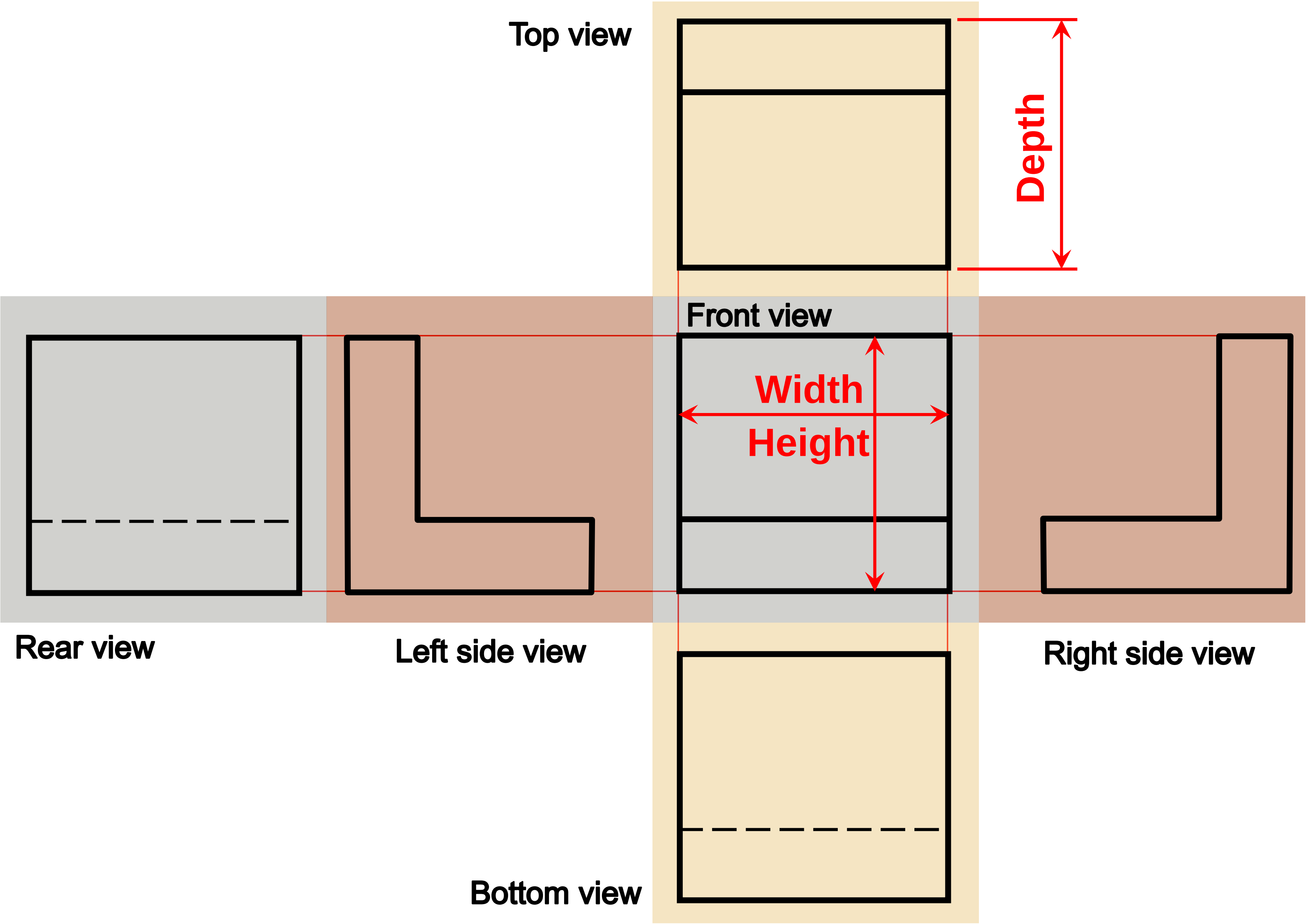




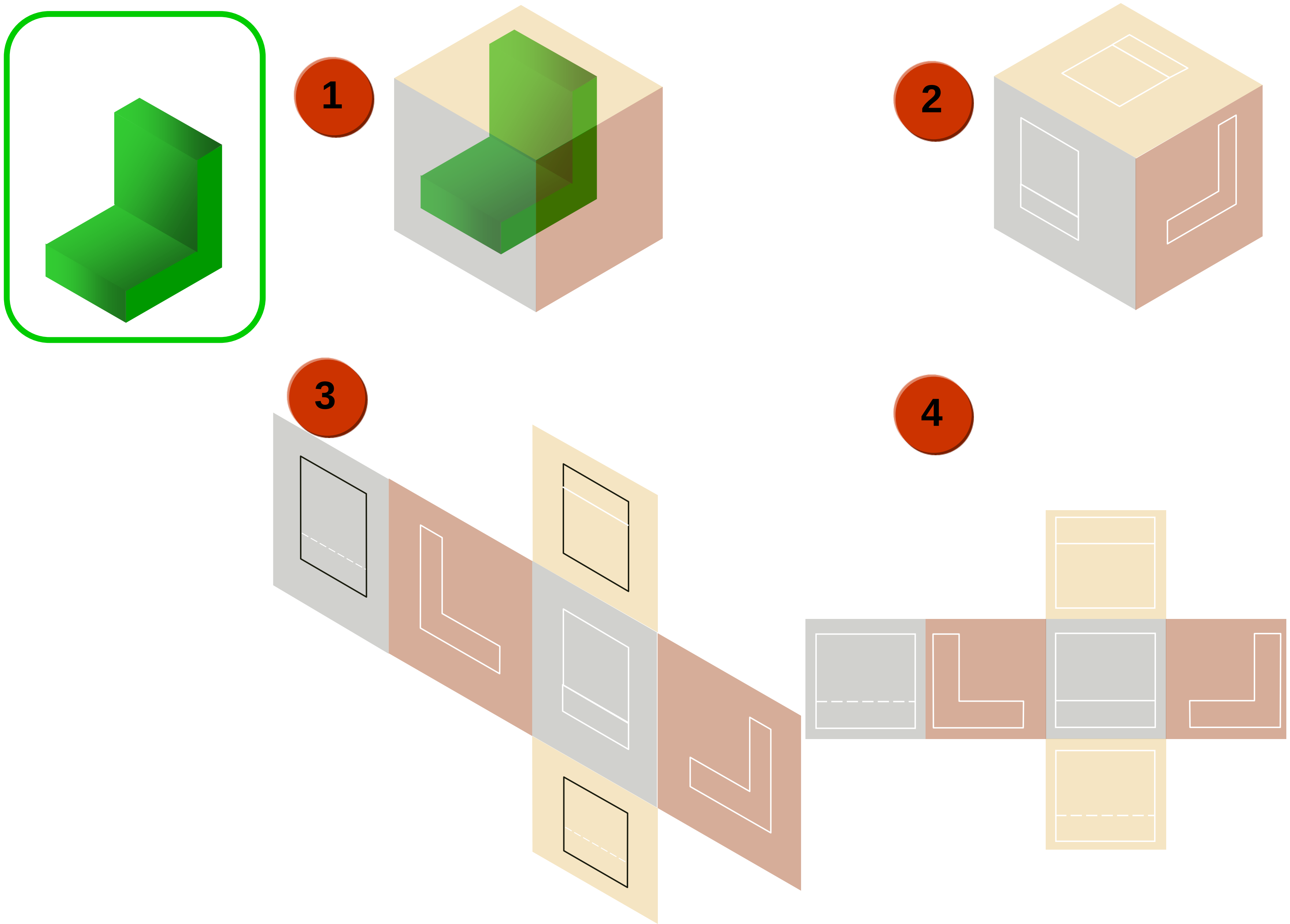
Glass box : Revolution of the planes of projection



Relative orientation of views

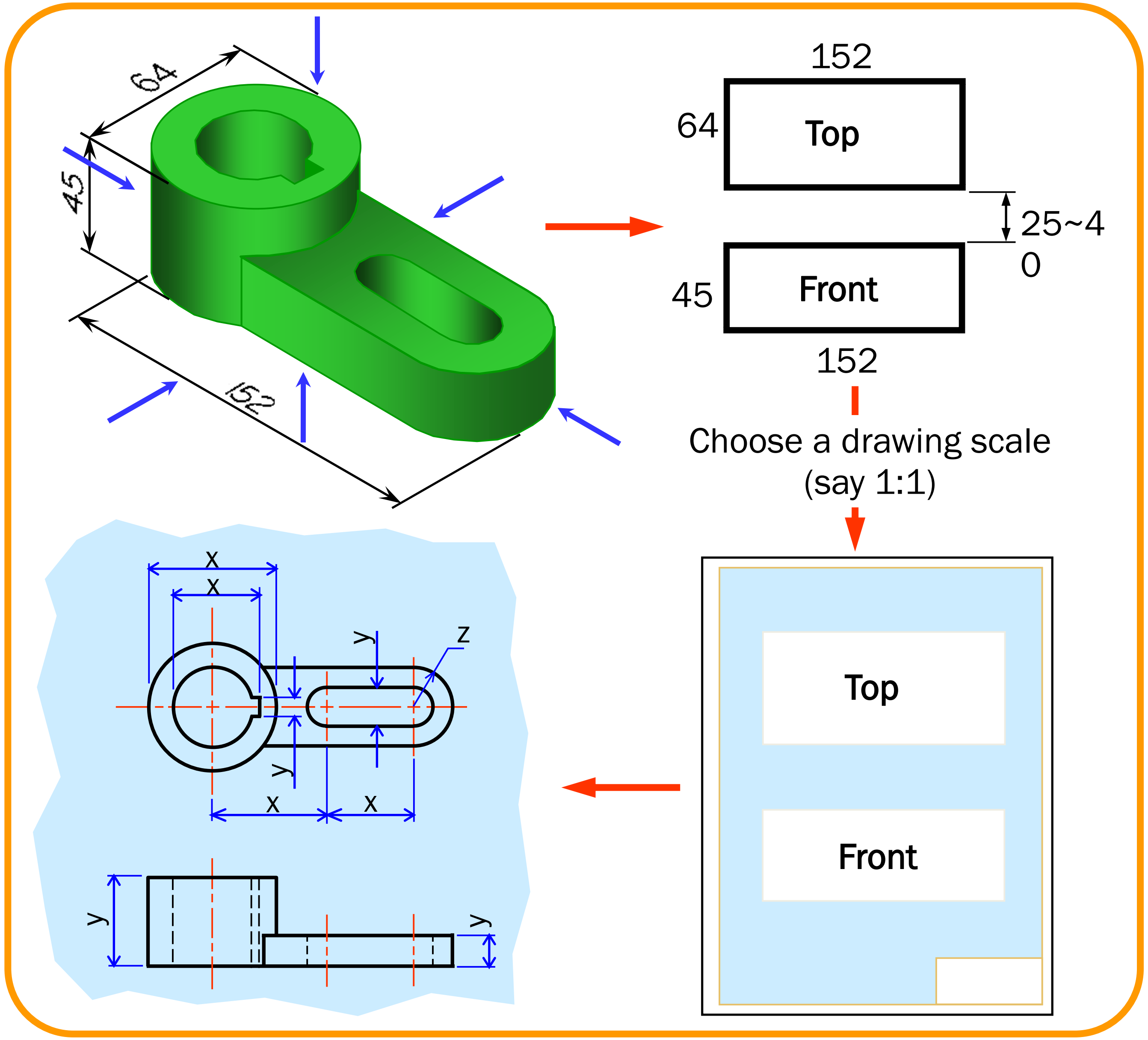


Summary : Problem solving steps



Steps for Orthographic Views

1. Select the necessary views
2. Layout the selected views on a drawing sheet.
3. Complete each selected views.
4. Complete the dimensions and notes.



View selection procedures

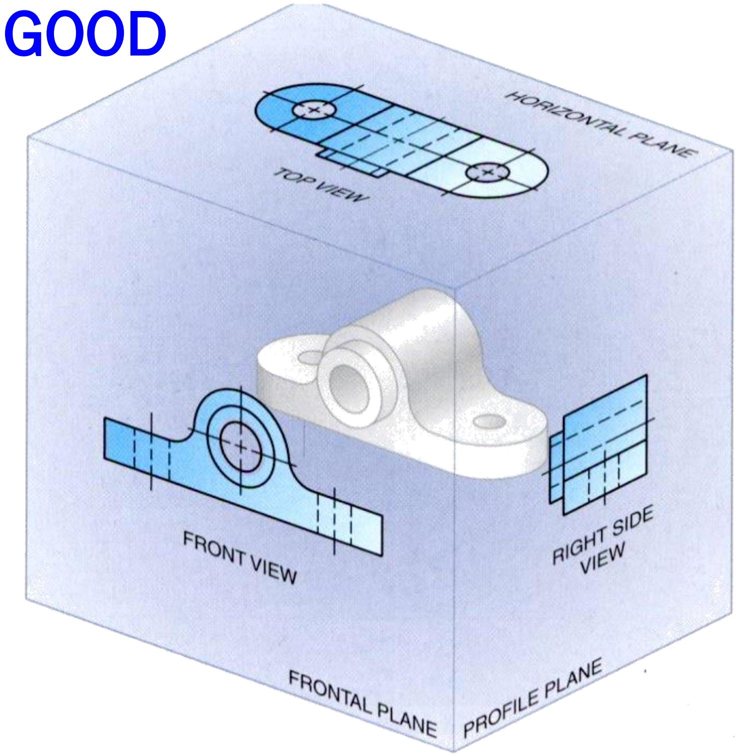
1. Orient the object to the best position relative to a glass box.

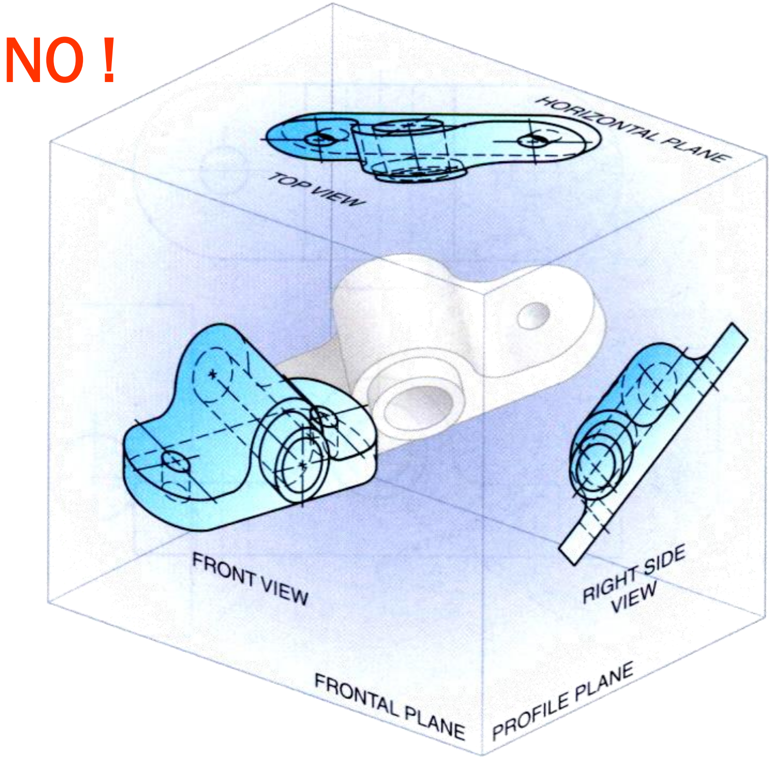
2. Select the front view.

3. Select adjacent views.

Suggestions: Orient the object

1. The object should be placed in its **natural position**.
2. The orthographic views should represent the **true size** and **true shape** of an object (as much as possible).



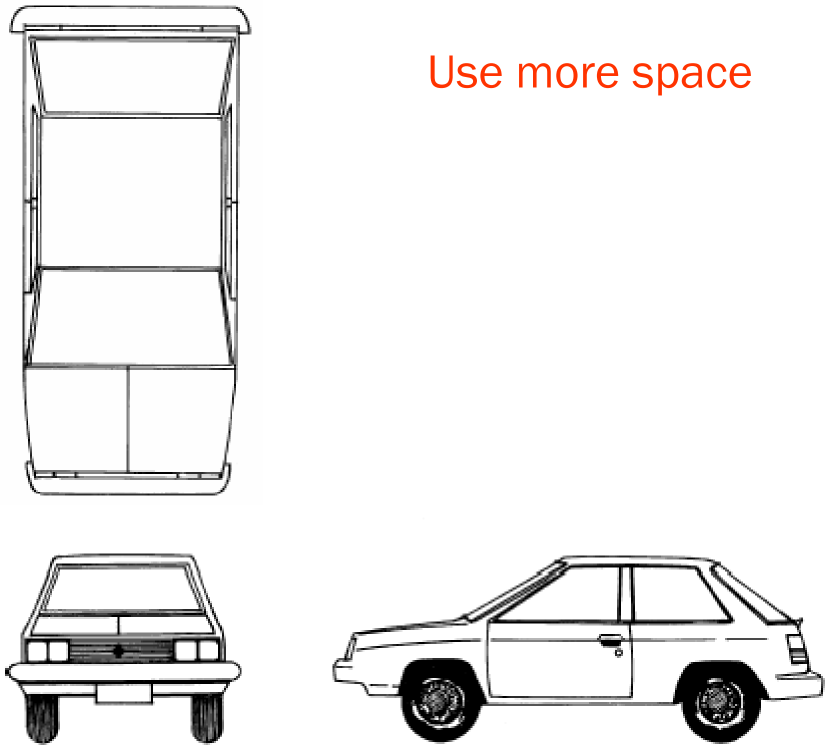


Suggestions: Select the front view

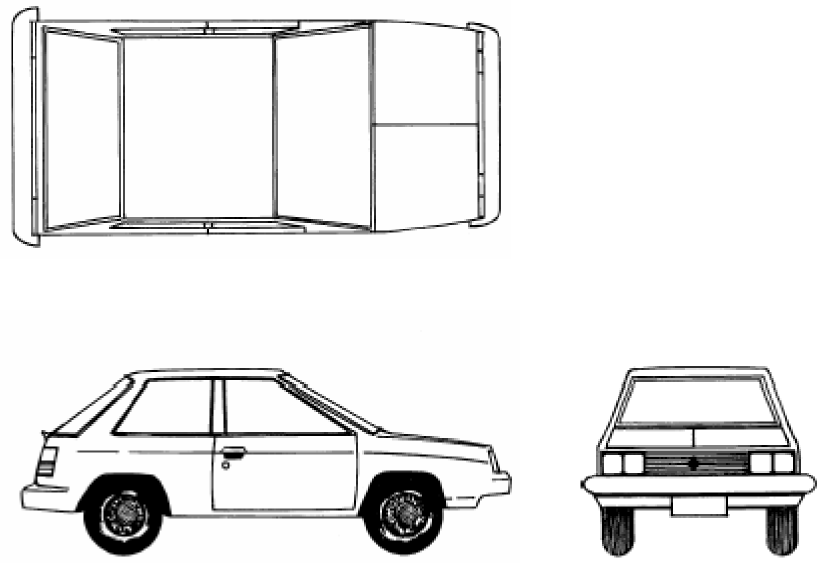
1. The **longest** dimension of an object should be presented as a **width** (in a front view).

First choice **Inappropriate**

Use more space



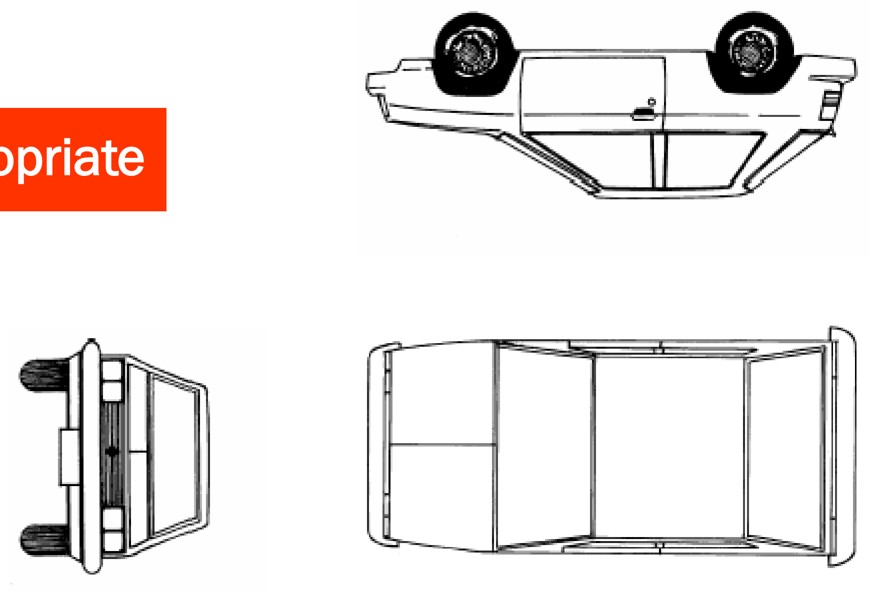
Second choice **Good**



Suggestions: Select the front view

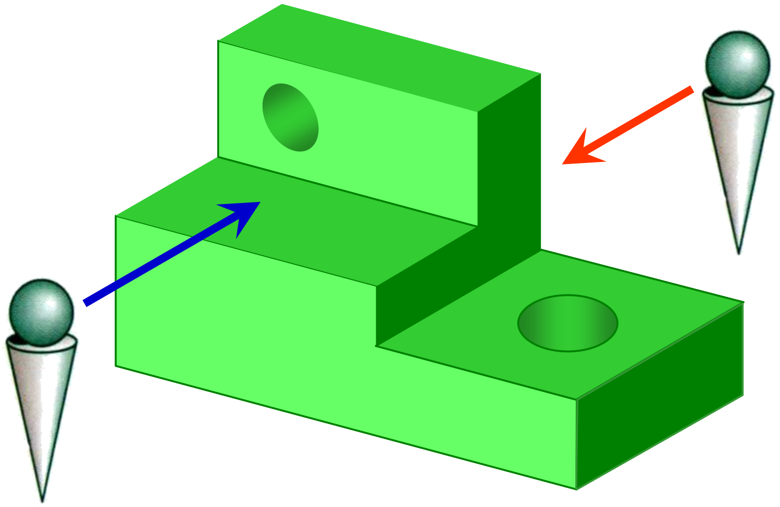
2. The adjacent views project from the selected front view should be appeared in a natural position.

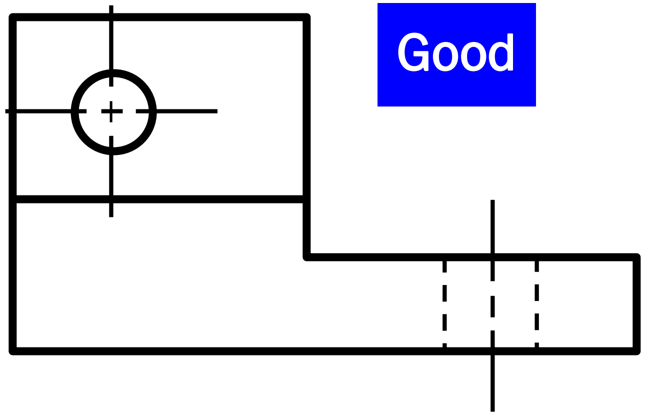
Inappropriate



Suggestions: Select the front view

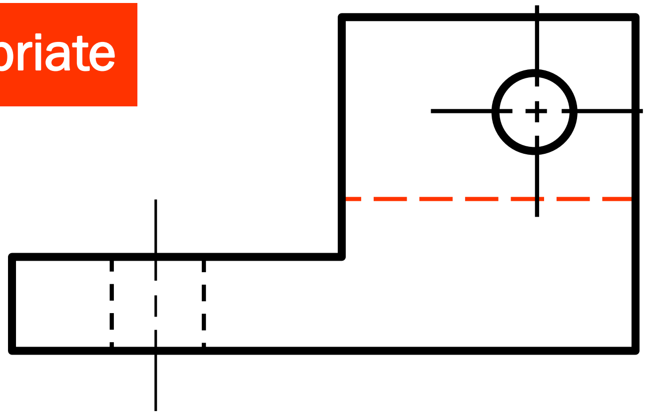
3. It has the fewest number of hidden lines.





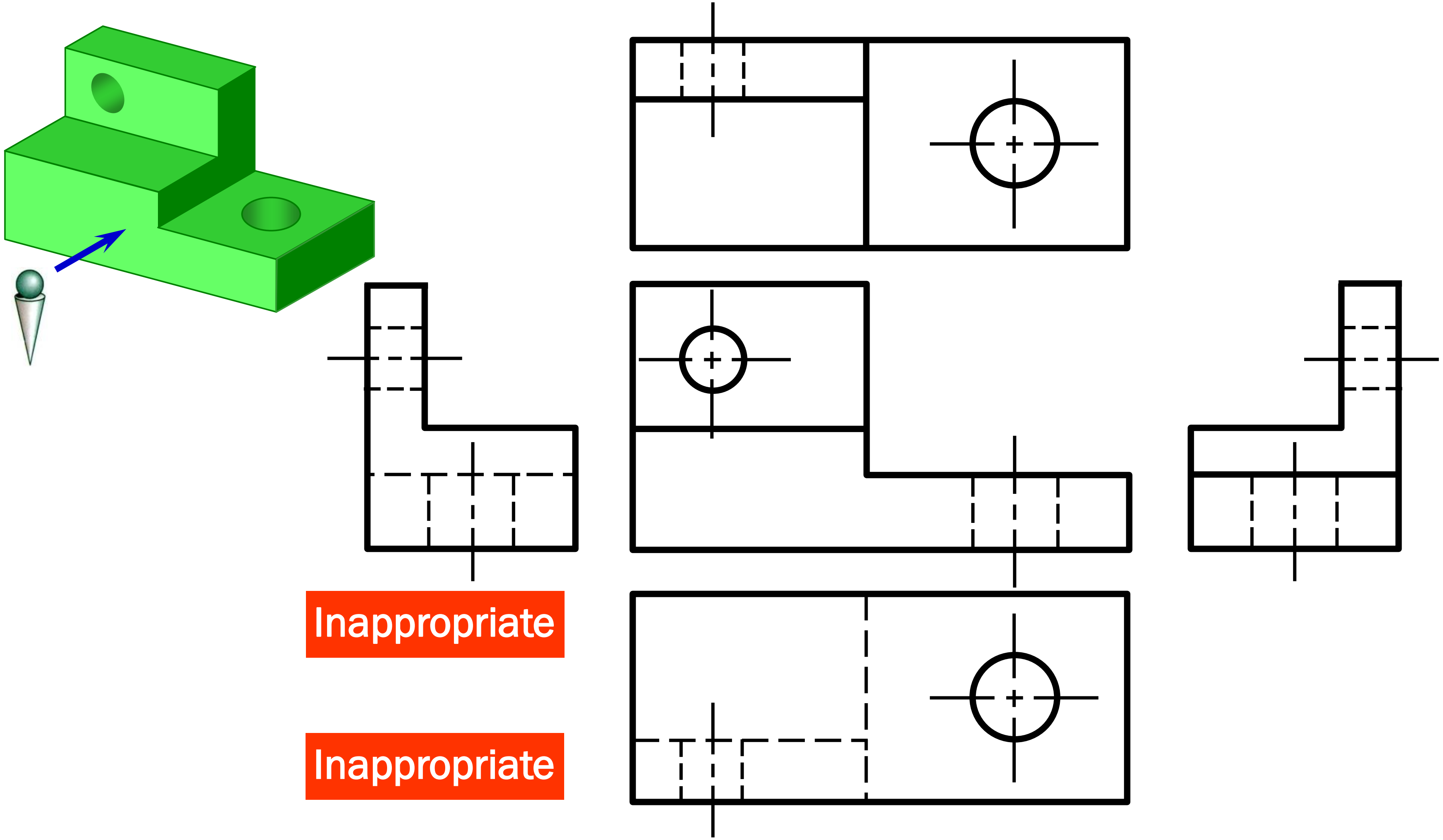
Good

Inappropriate



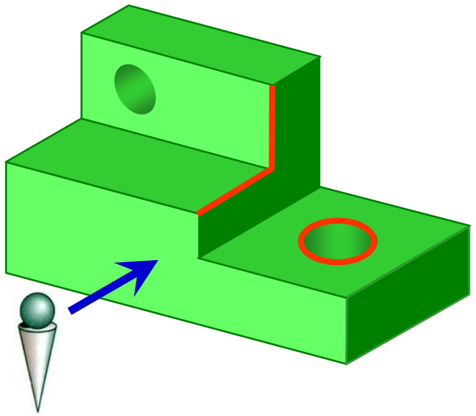
Suggestions: Select an adjacent view

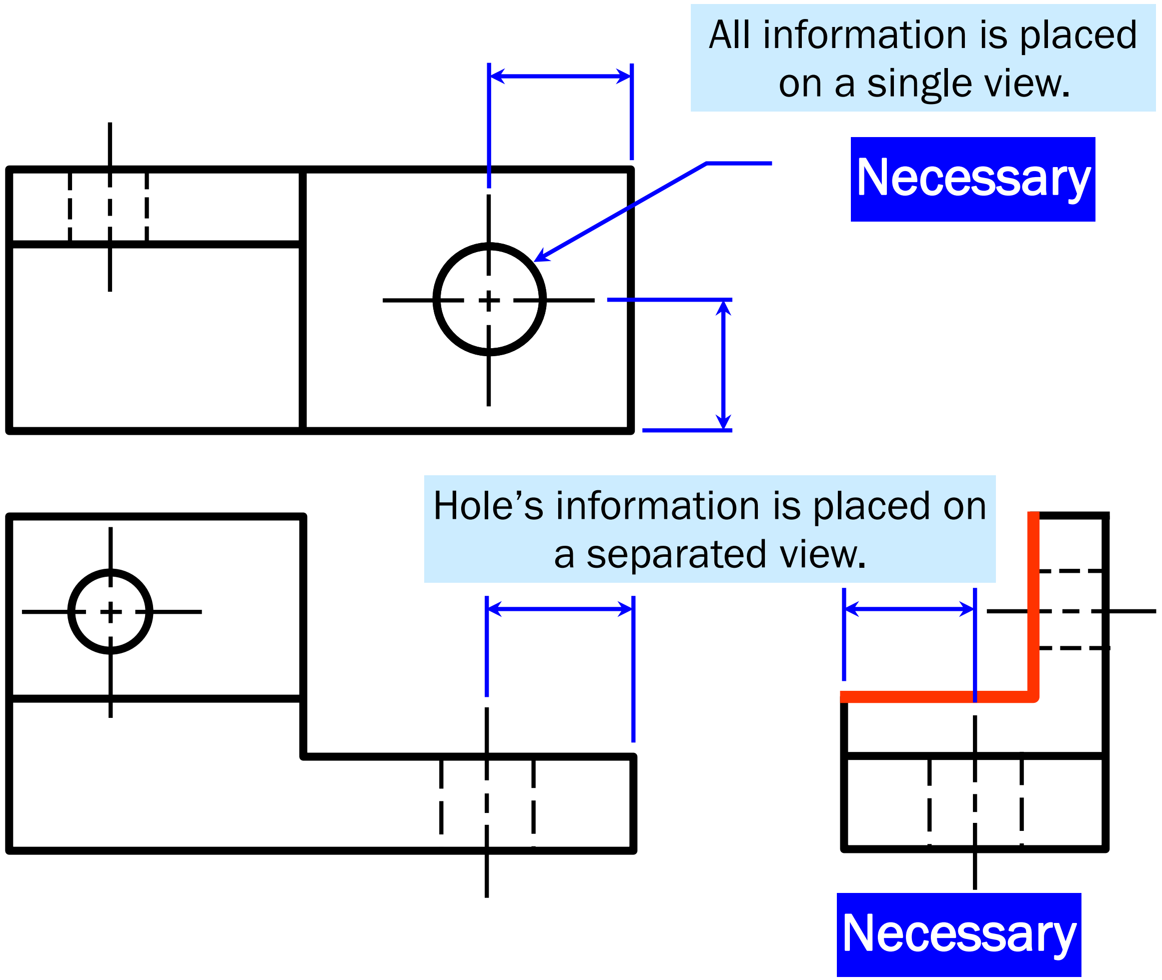
1. Choose the view that has the fewest number of hidden lines.



Suggestions: Select an adjacent view

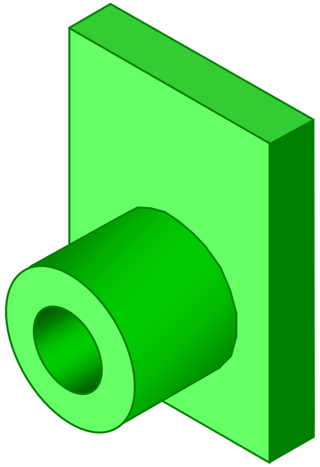
2. Choose the **minimum** number of views that can represent the major features of the object.

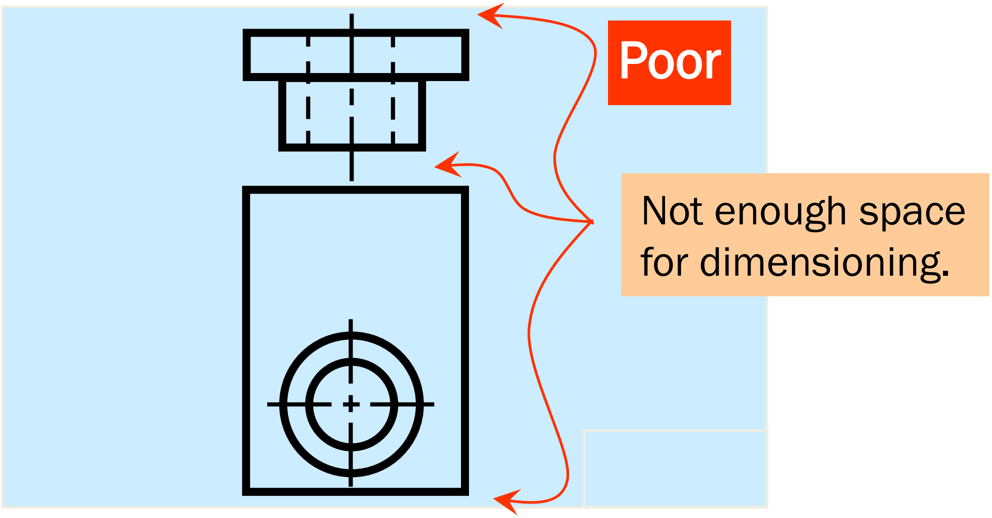


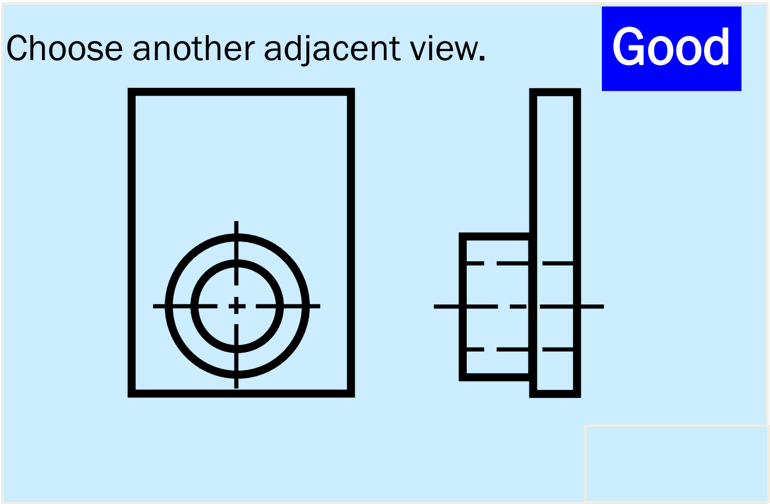


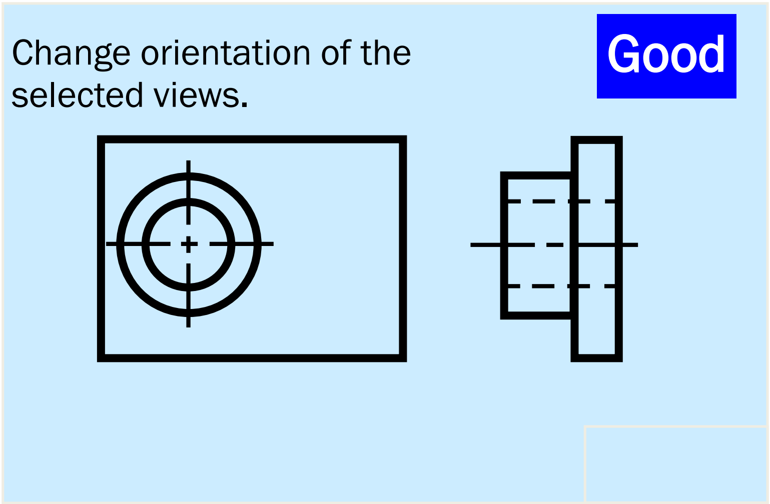
Suggestions: Select an adjacent view

3. Choose the views that are suitable to a drawing sheet.









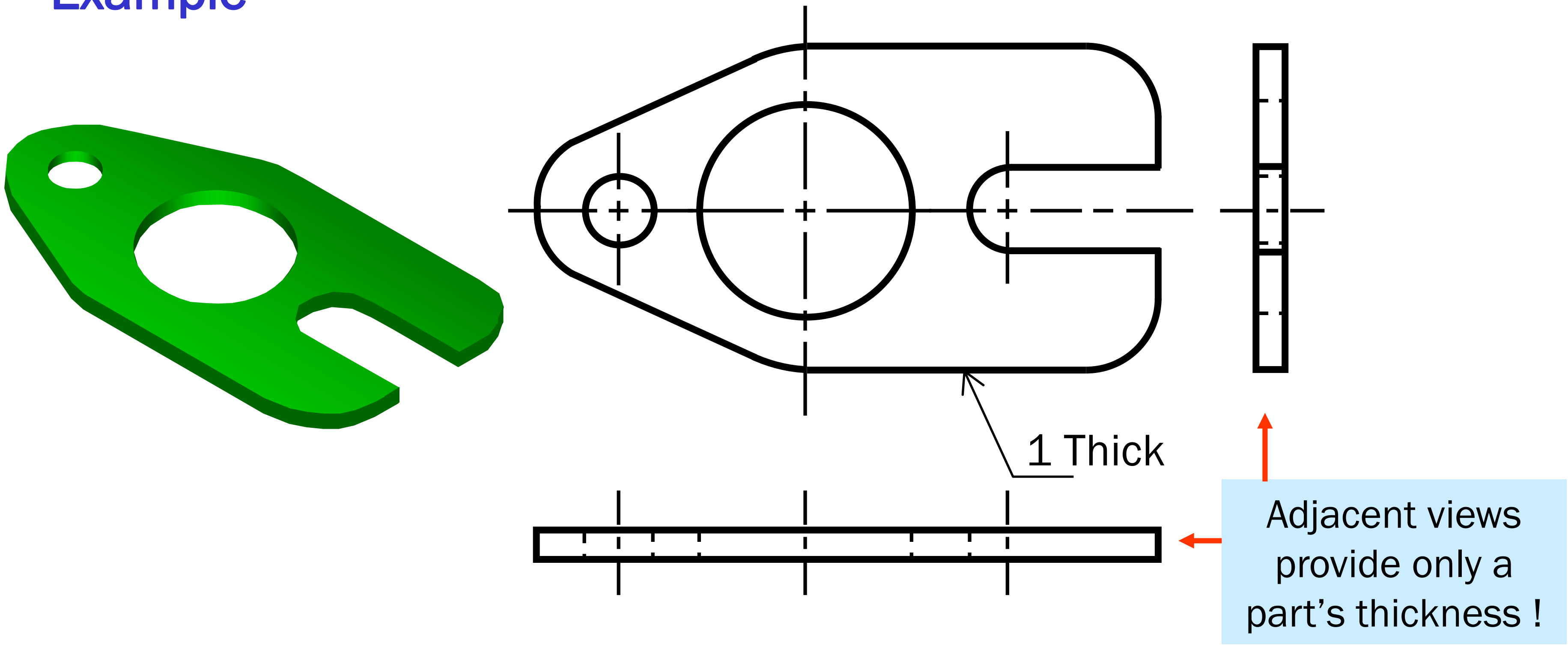
Summary

- View selection has 3 steps

Object that requires only one–view

- Flat (thin) part having a uniform thickness such as a gasket, sheet metal etc.
- Cylindrical-shaped part.

Example



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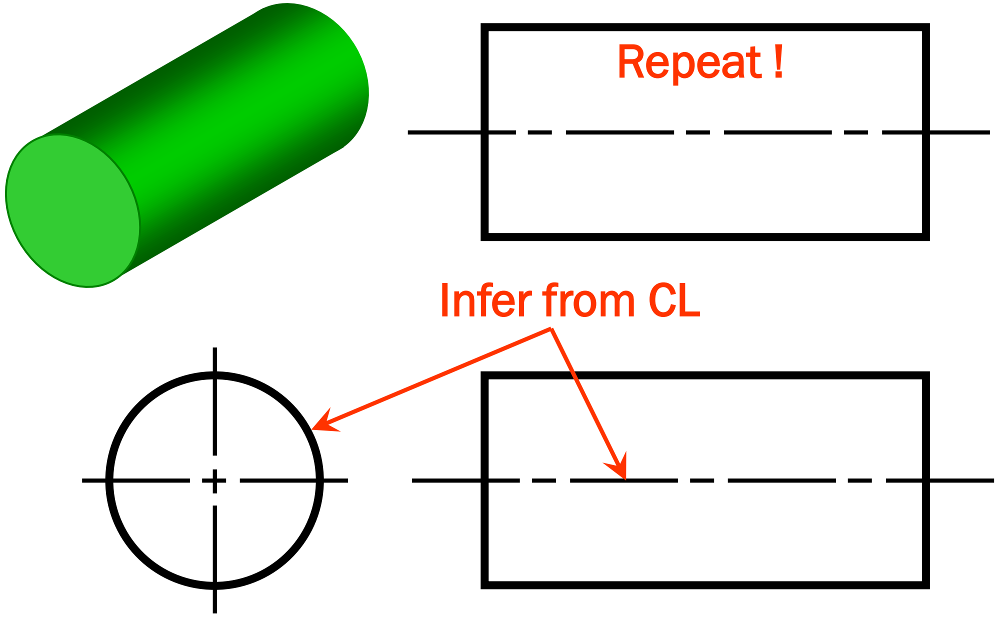
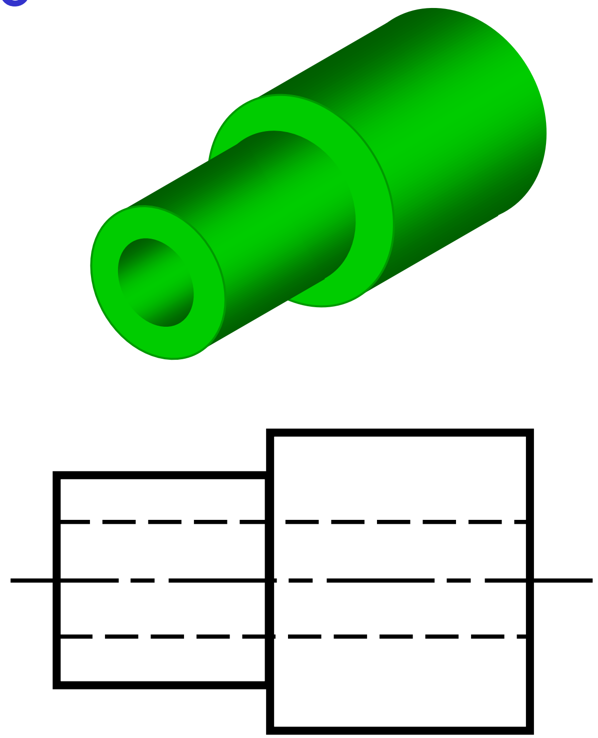


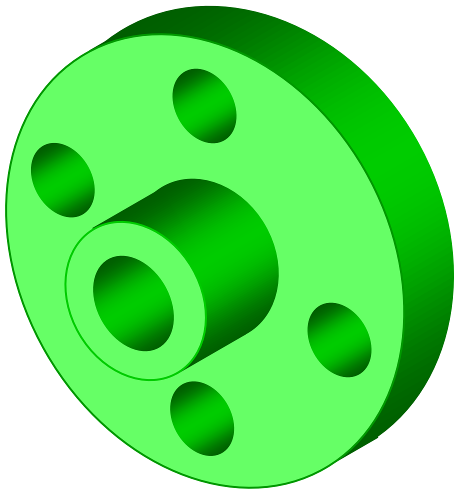
Example

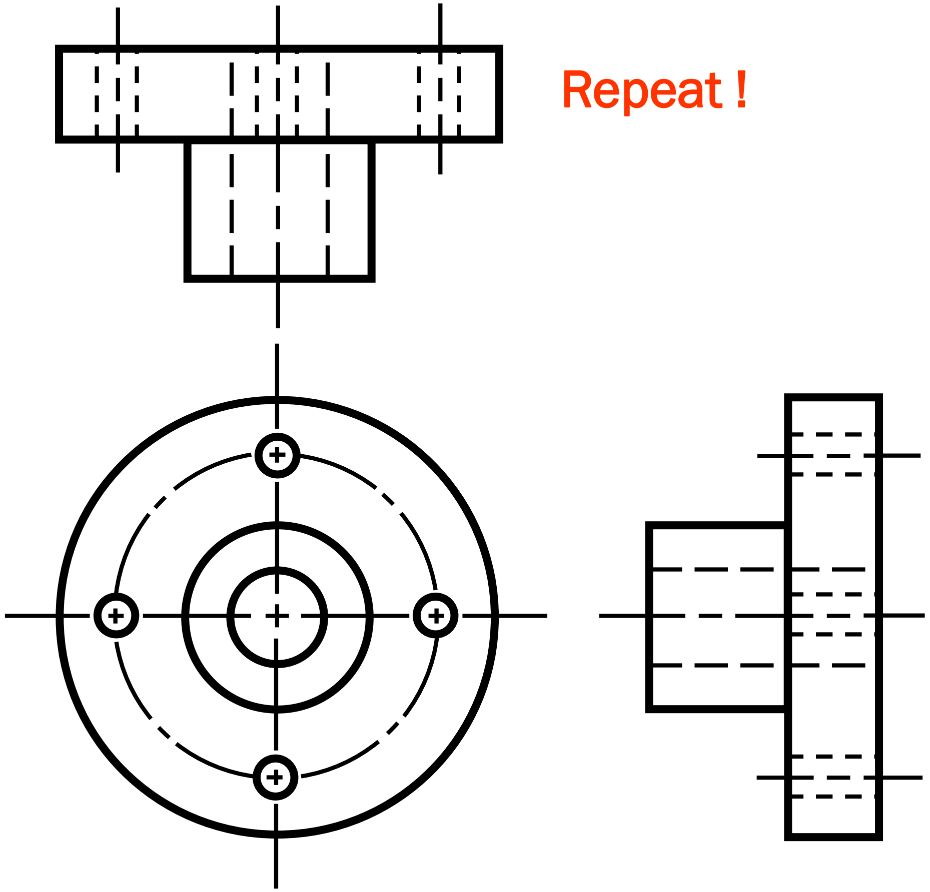


Object that requires only two-view

- Identical adjacent view exists.
- The 3rd view has no significant contours of the object. (provides no additional information)

Example





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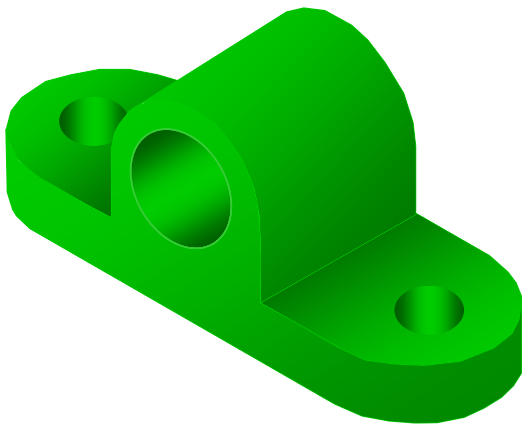
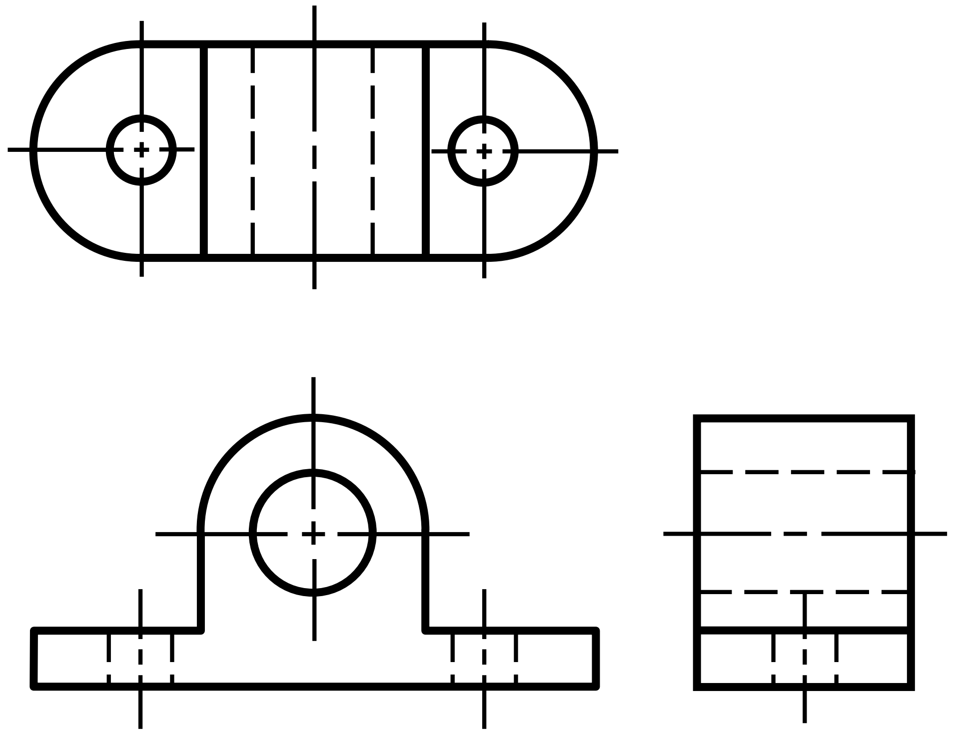
Example 1





Object that requires only two-view

- Identical view exists.
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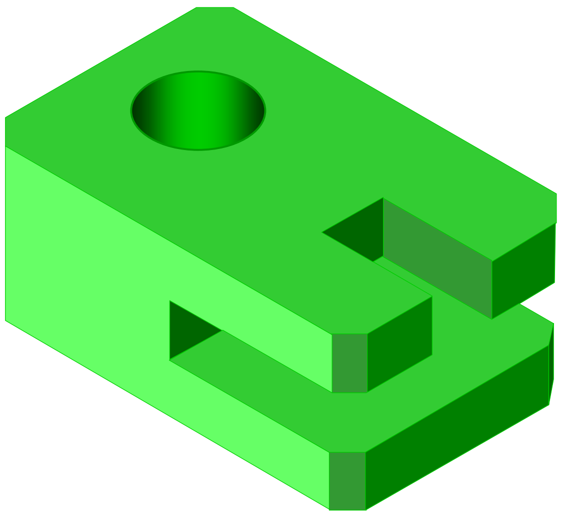
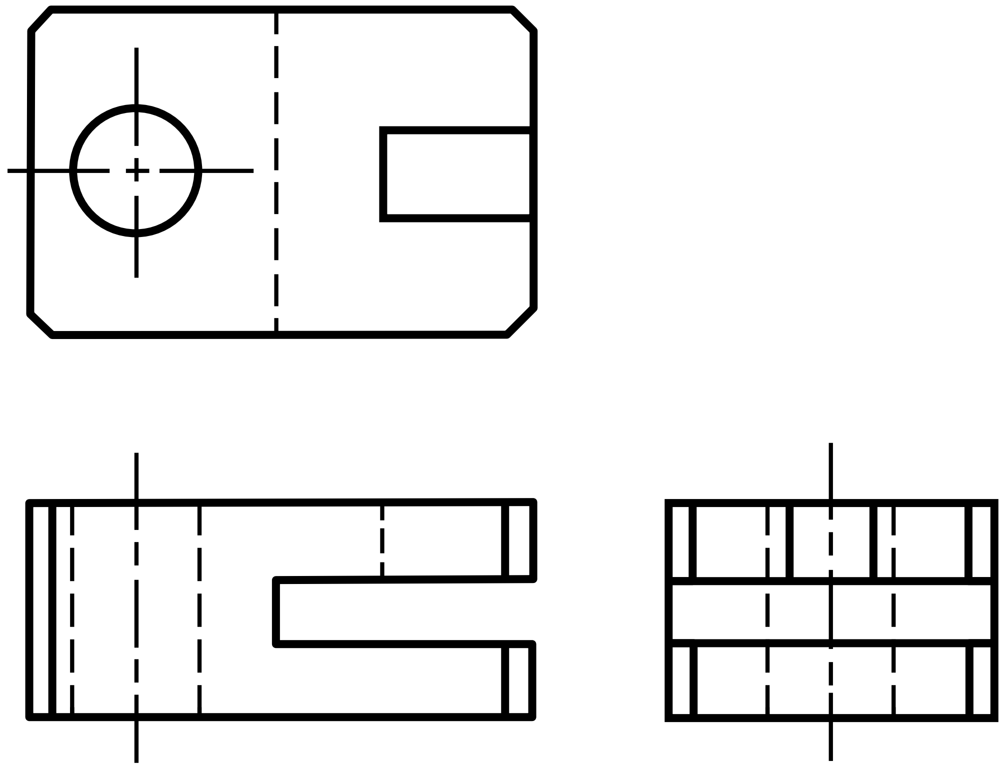
Example 2





Example–1

Draw the orthographic projections of Fig. 1

Steps to draw projections

- Identify surfaces perpendicular or inclined to the view
- Surfaces parallel to the view would not be visible in that view.
- First draw horizontal and vertical reference planes (easily identifiable on drawing)
- Start drawing from the reference planes.

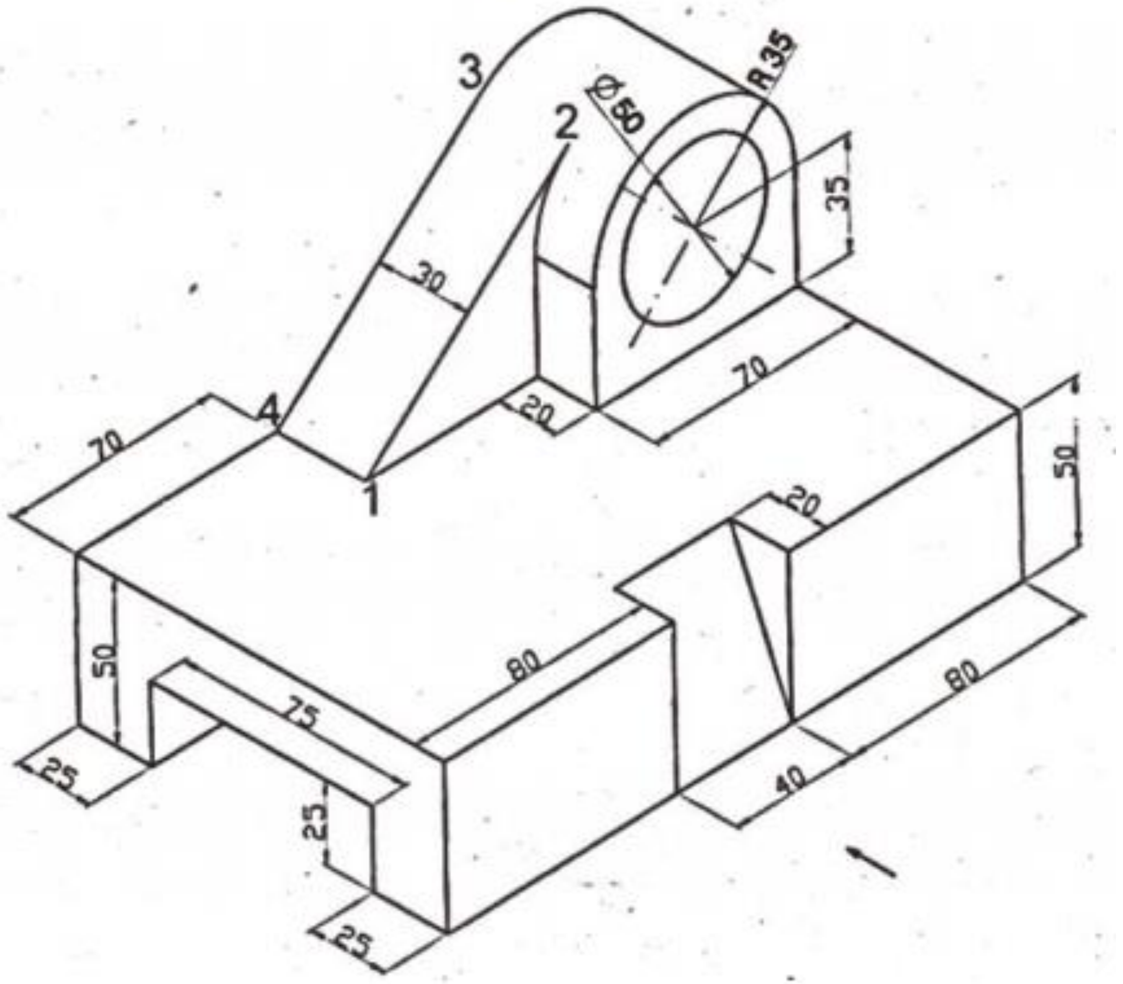
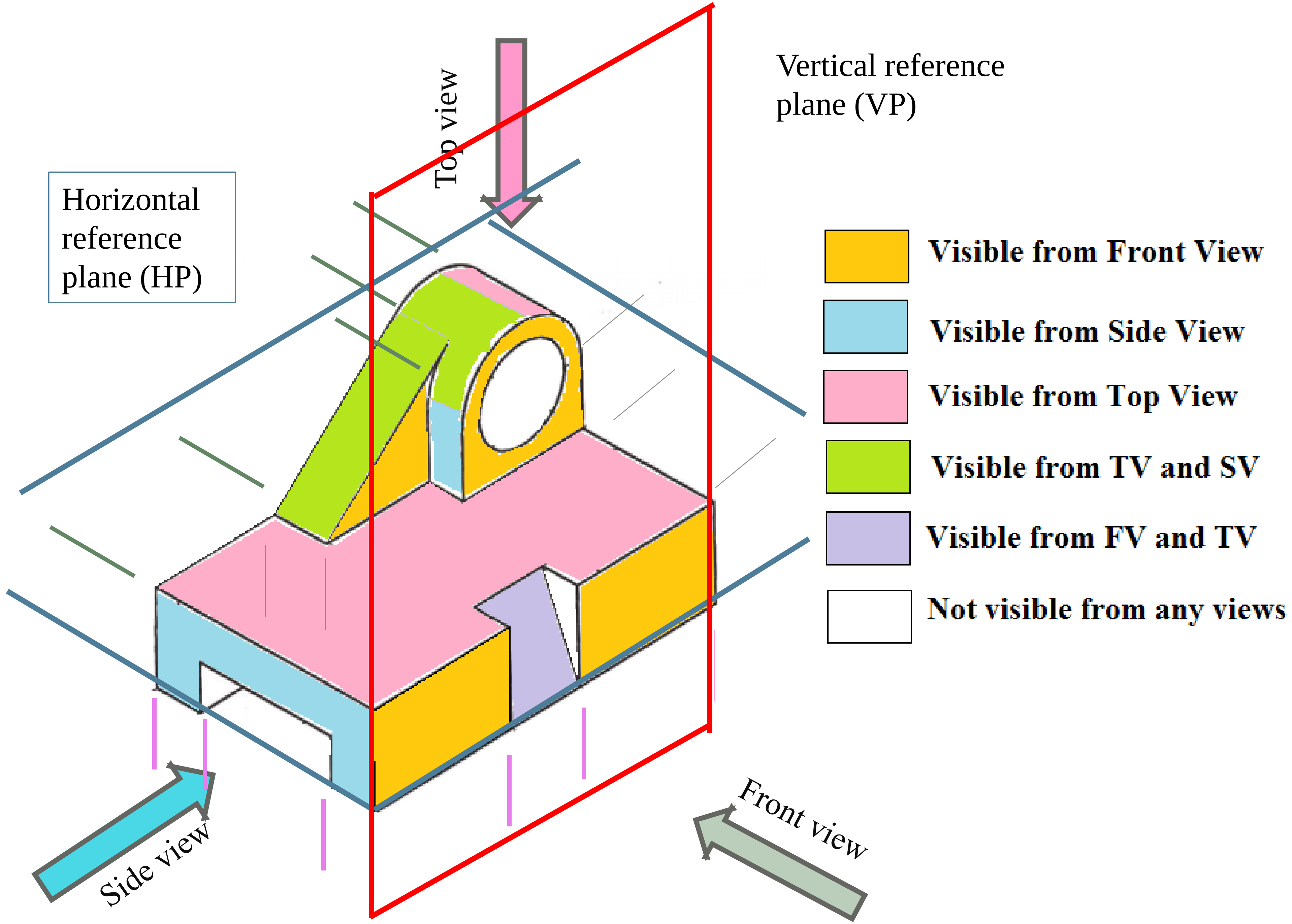
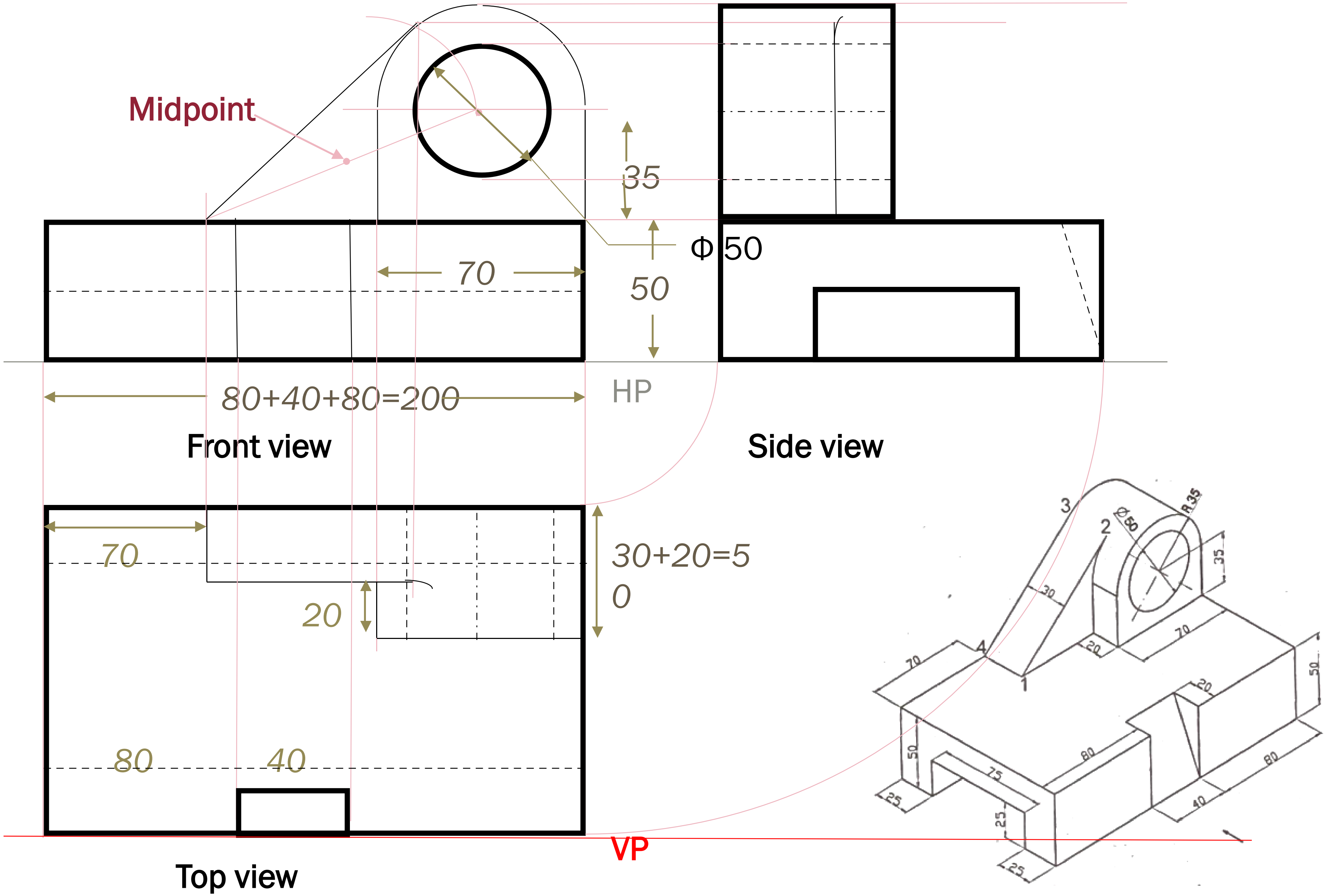


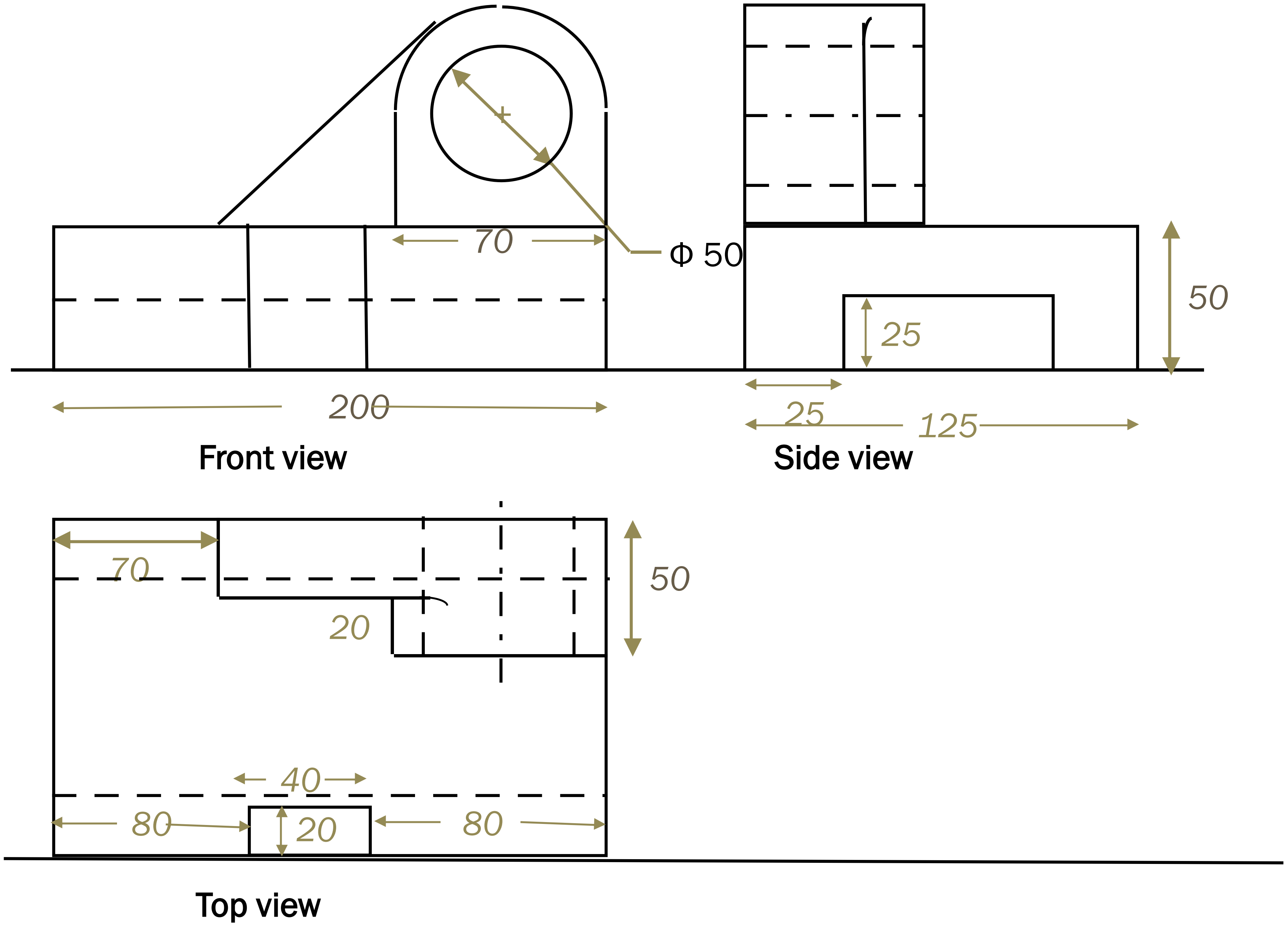
Fig. 1



Vertical reference plane (VP)
Top view
Horizontal reference plane (HP)
Visible from Front View
Visible from Side View
Visible from Top View
Visible from TV and SV
Visible from FV and TV
Not visible from any views
Side view
Front view

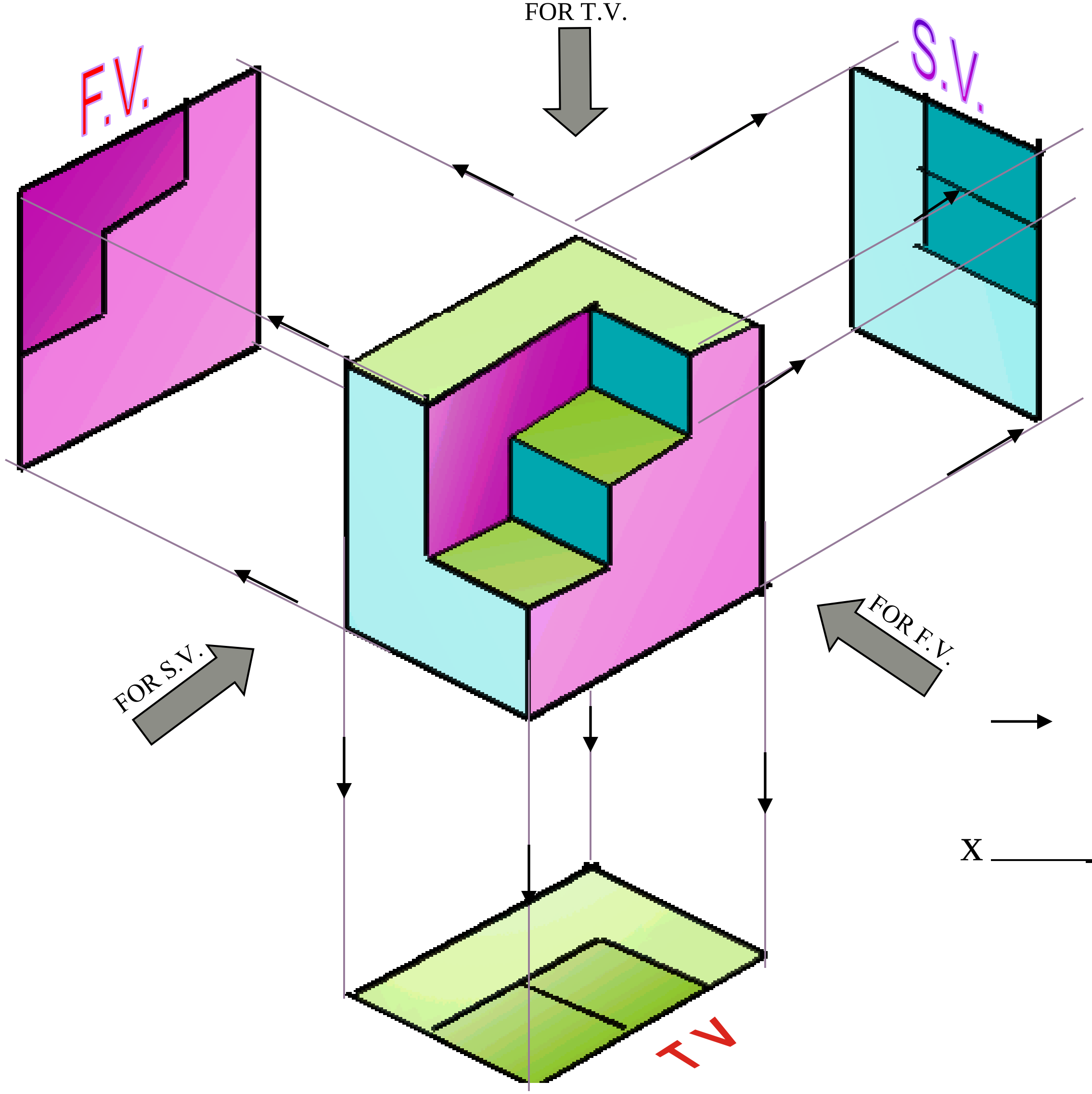


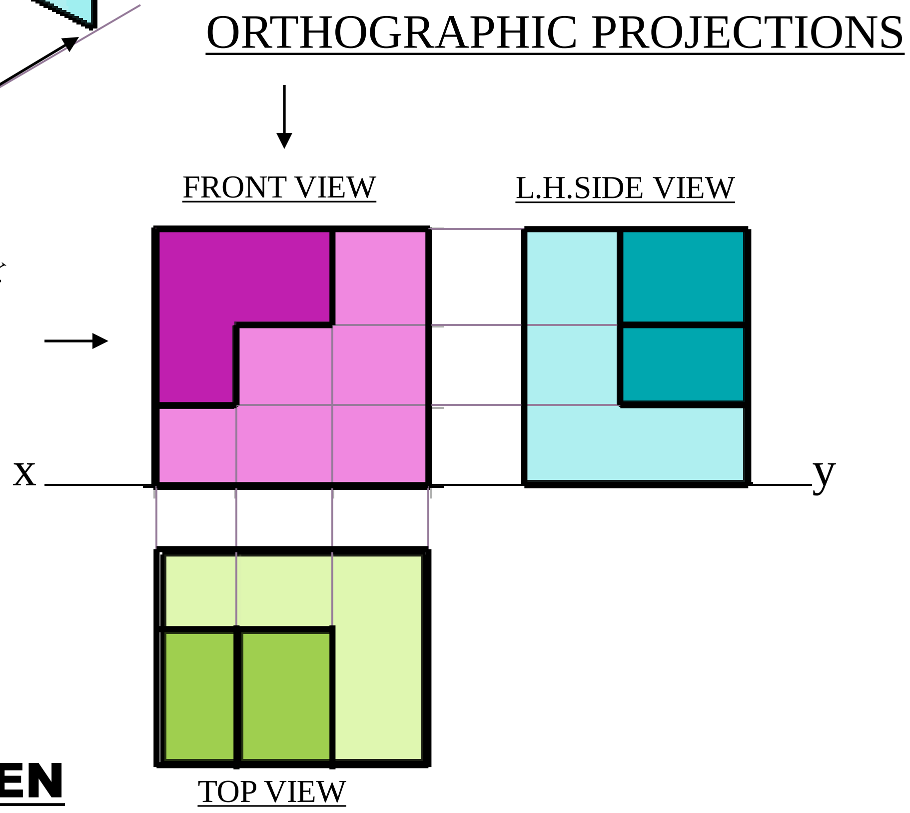
Midpoint
35
Φ 50
70
50
80+40+80=200
HP
Front view
Side view
70
30+20=5
0
20
80
40
VP
Top view



70
Φ 50
200
Front view
50
25
25
125
Side view
70
20
50
40
80
20
80
Top view

Example–2

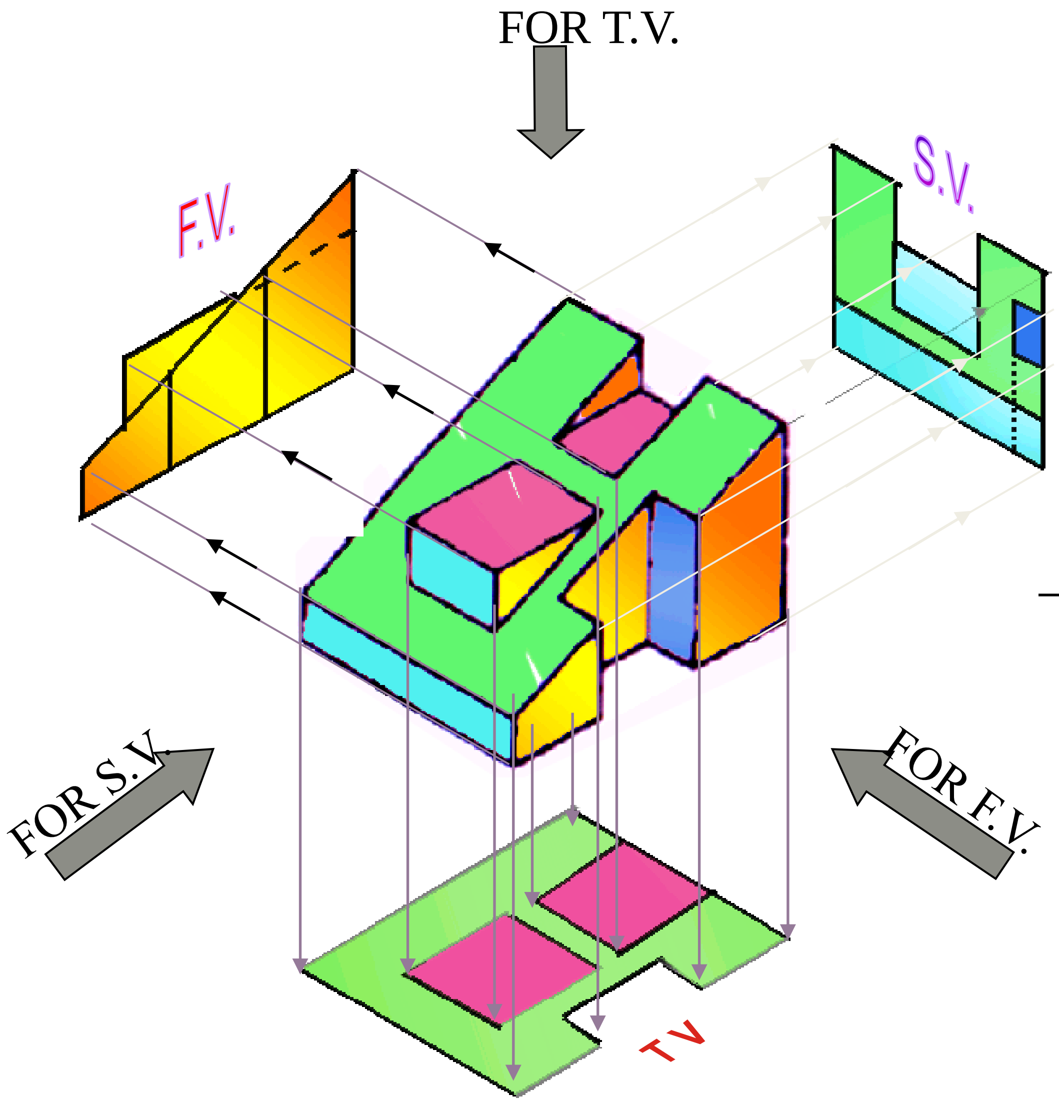




PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

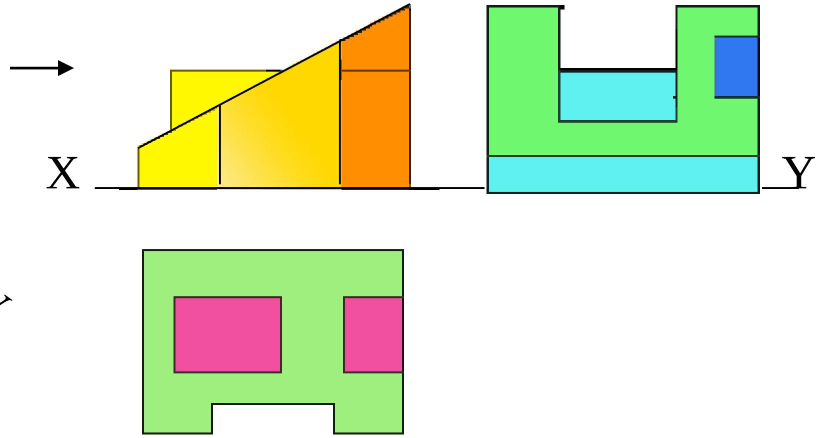
Example-3



ORTHOGRAPHIC PROJECTIONS

FRONT VIEW

L.H.SIDE VIEW



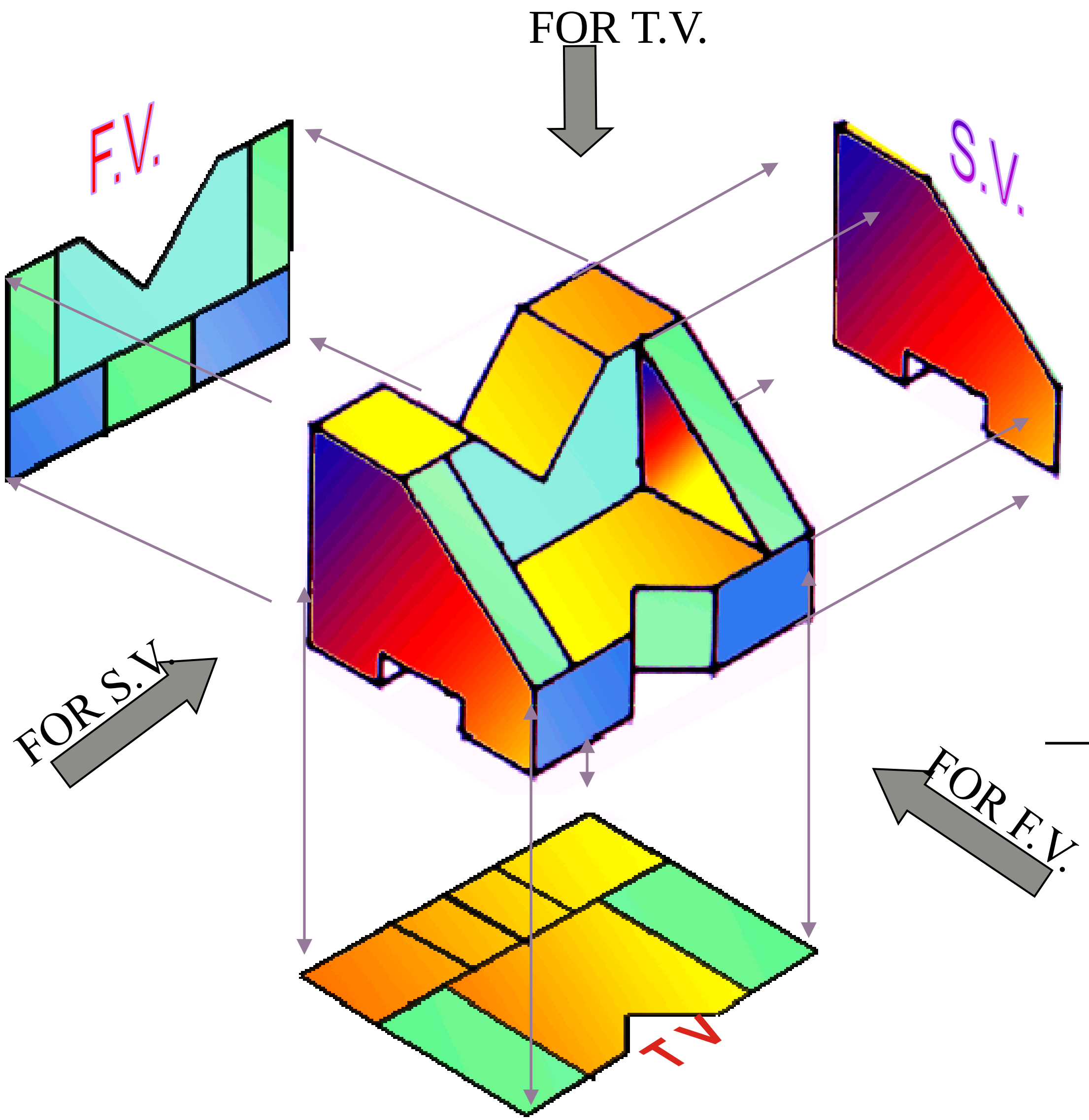
TOP VIEW

PICTORIAL PRESENTATION IS GIVEN

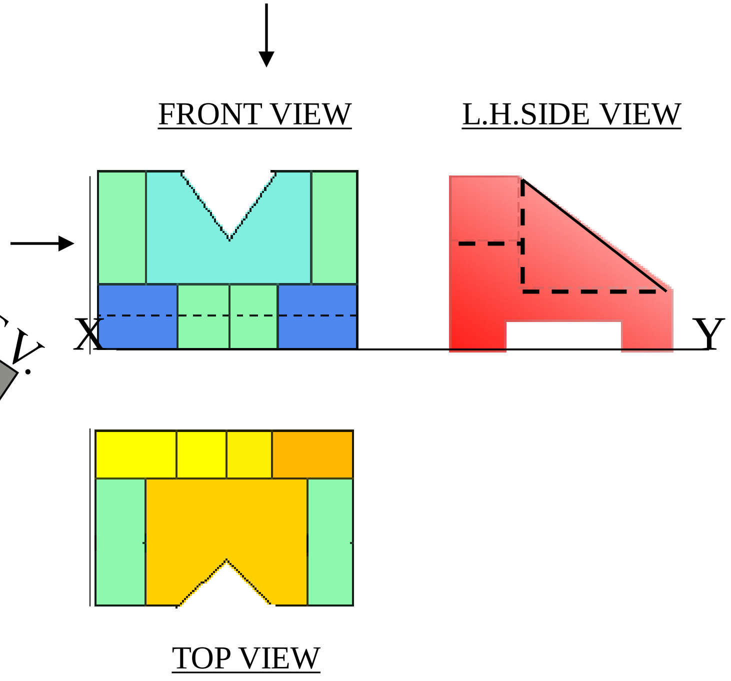
DRAW THREE VIEWS OF THIS OBJECT

BY FIRST ANGLE PROJECTION METHOD

Example–4

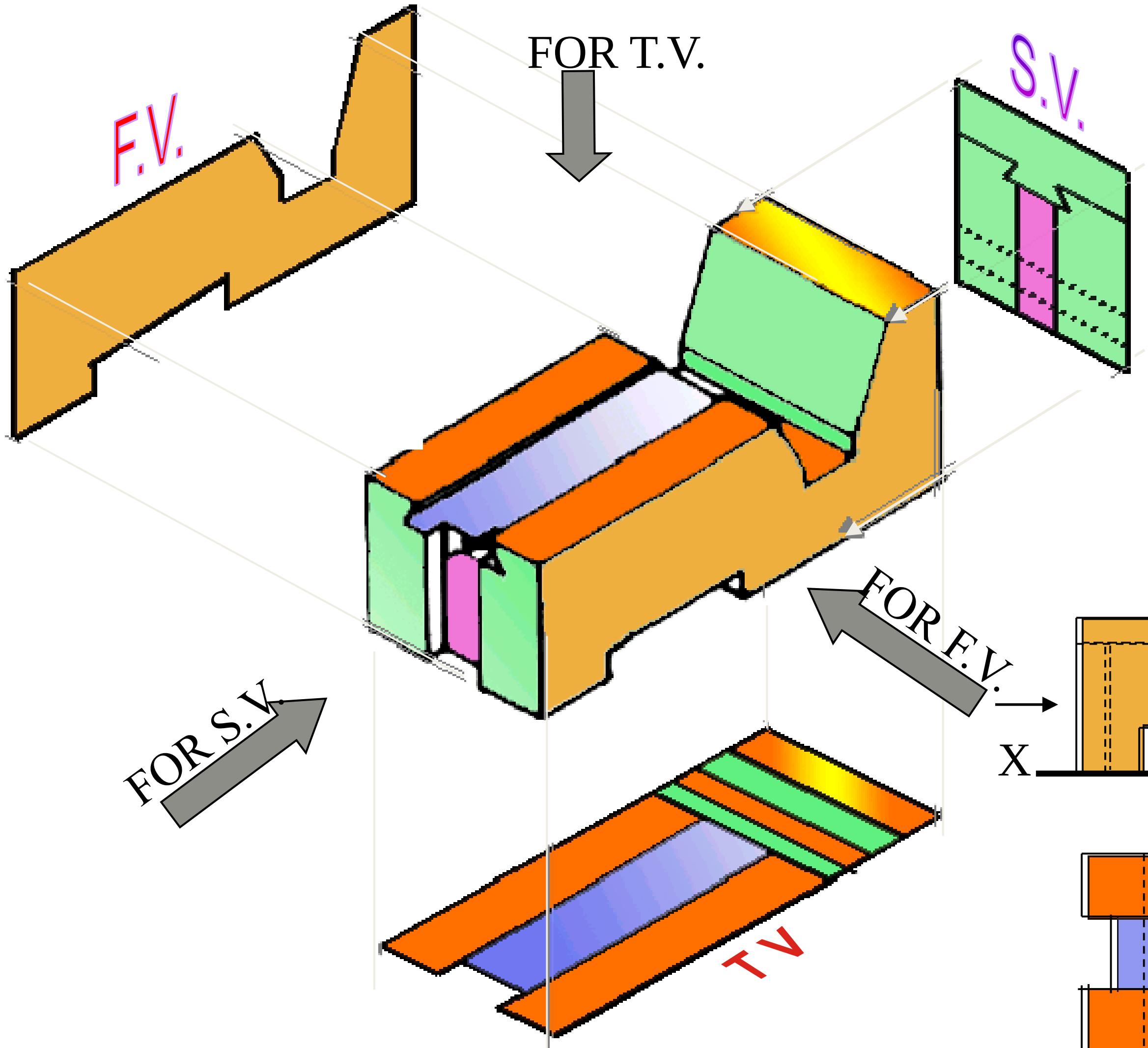


ORTHOGRAPHIC PROJECTIONS

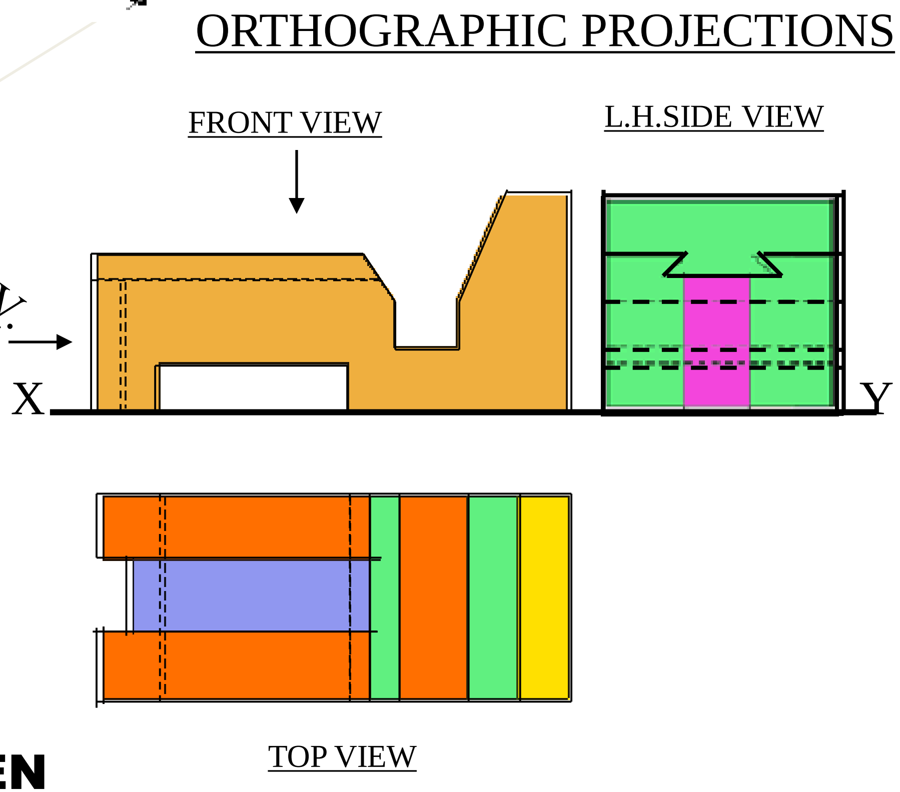


PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD



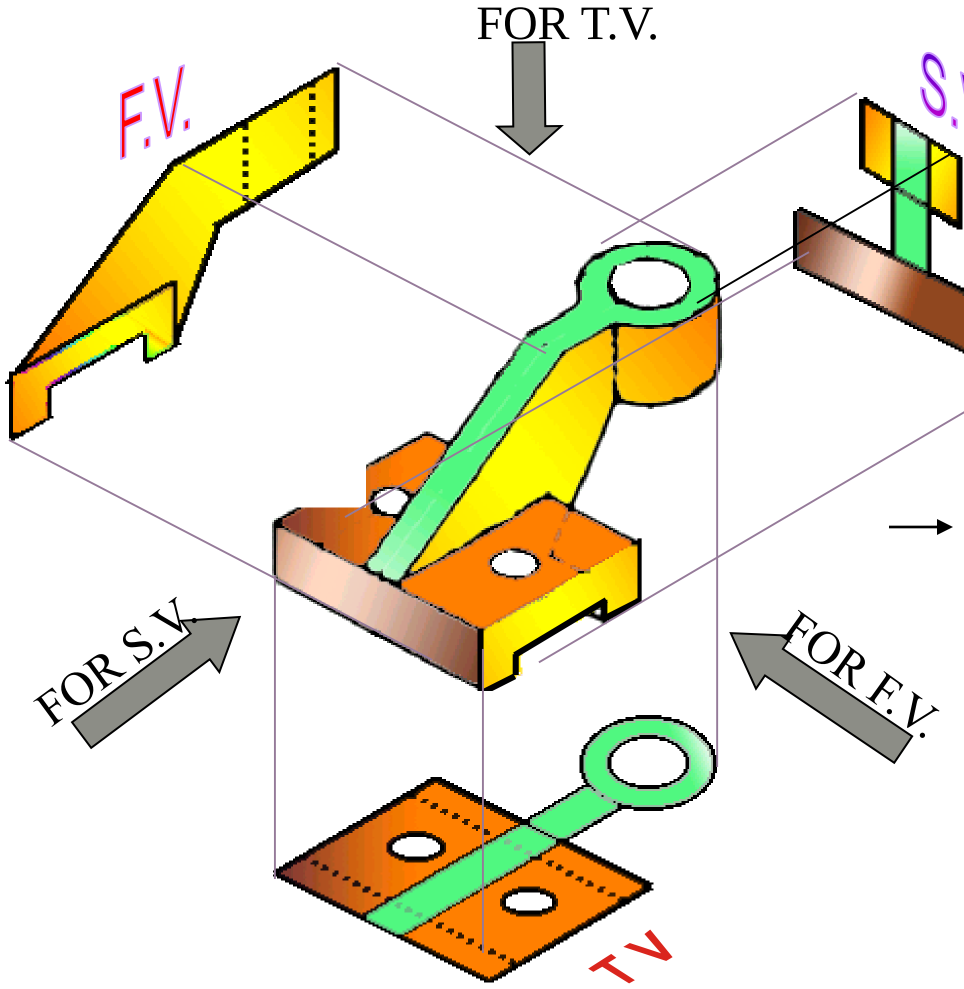
Example-5



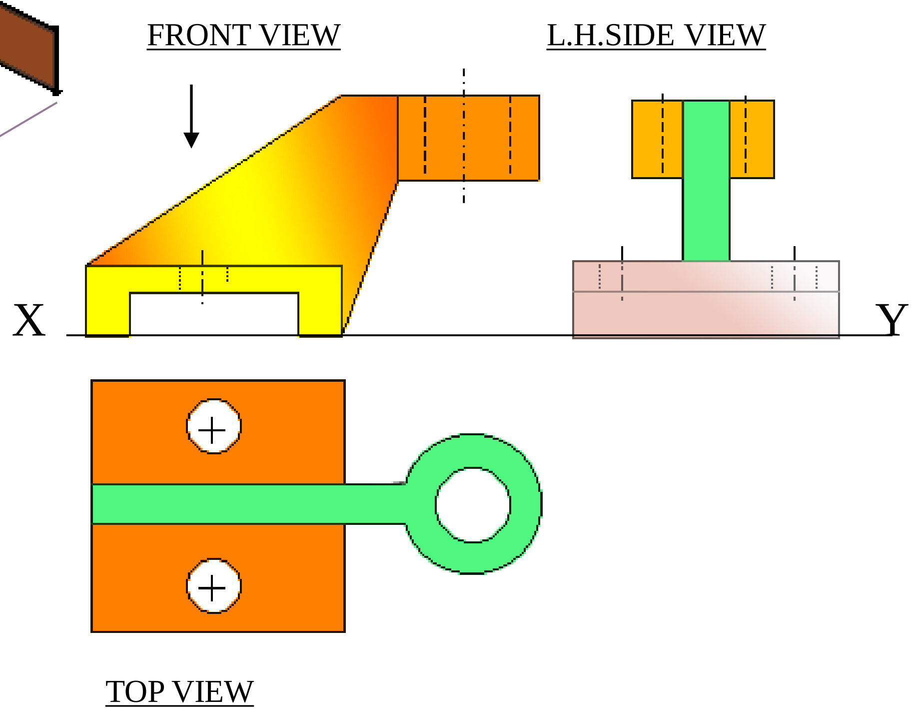
PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

Example–6



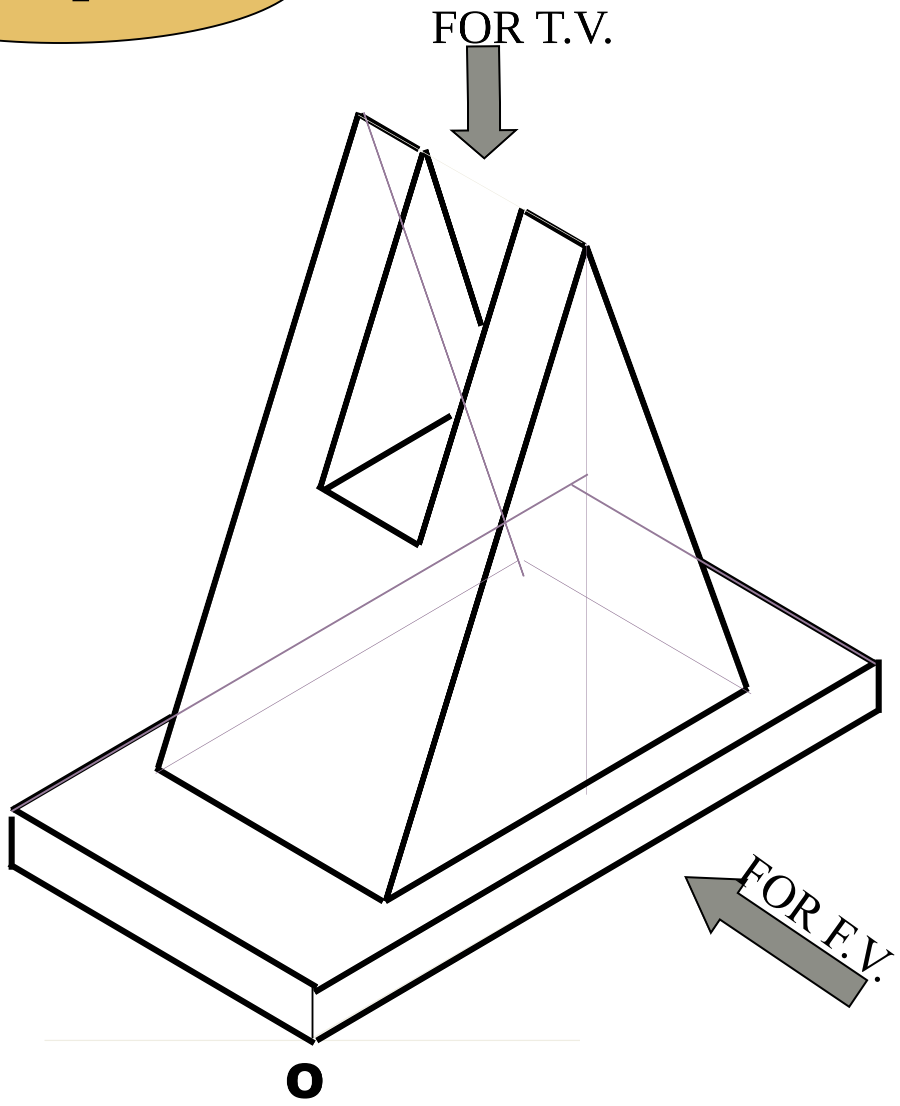
ORTHOGRAPHIC PROJECTIONS



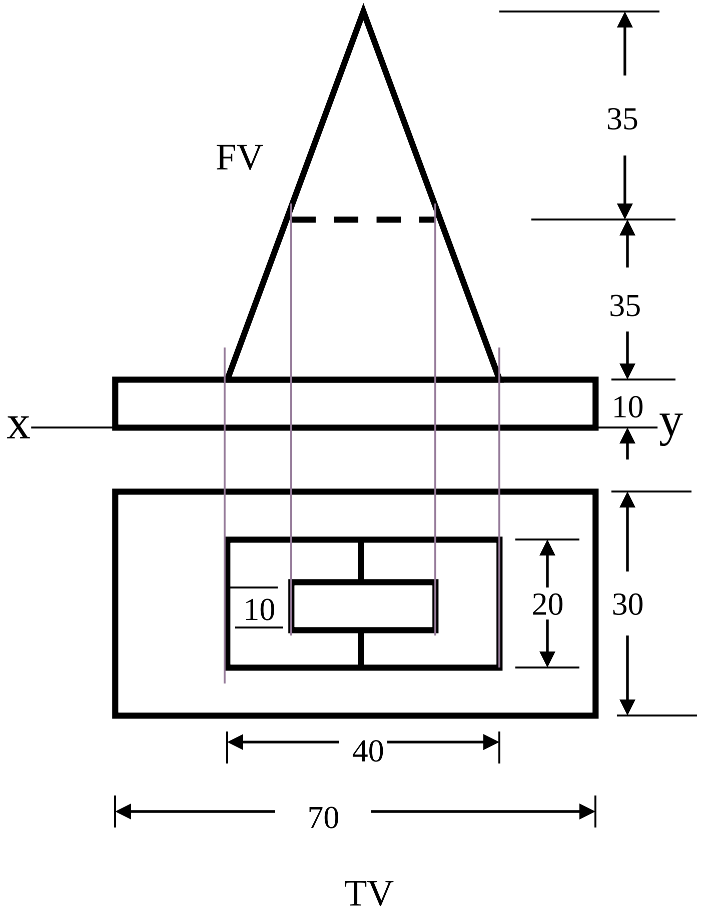
PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

Example-7



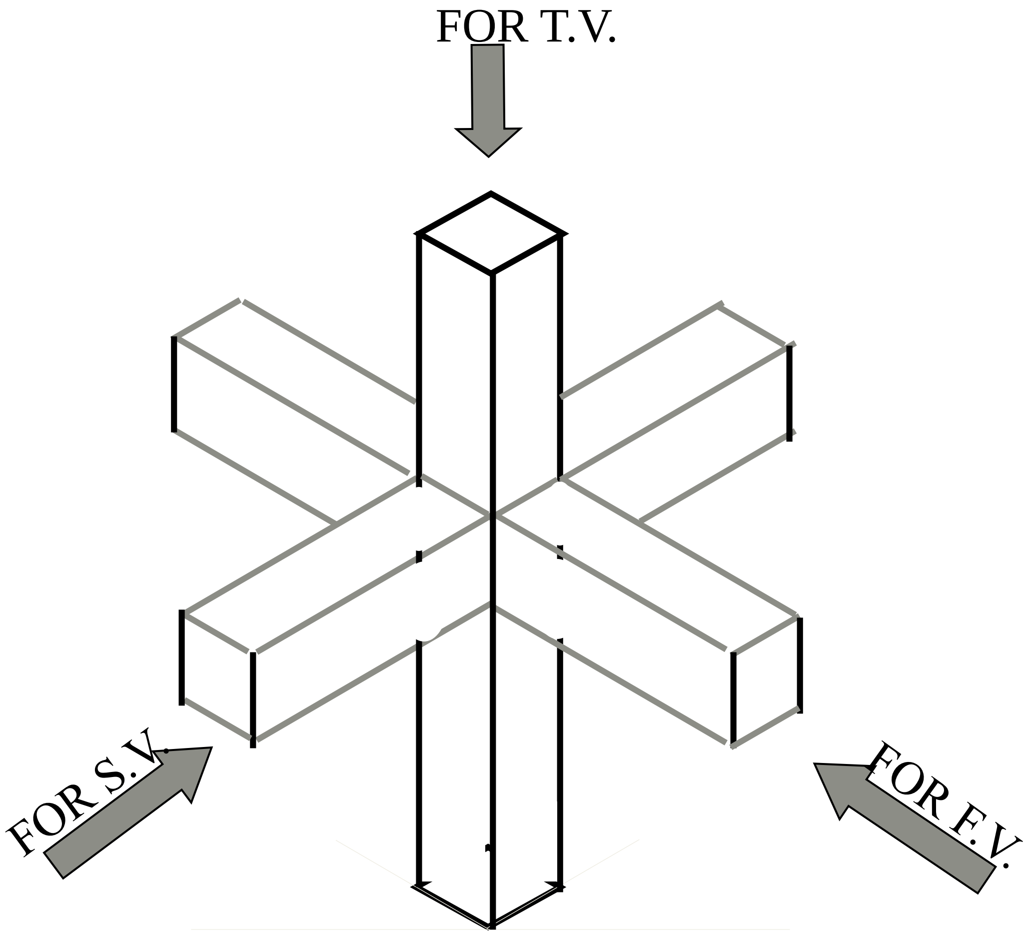
ORTHOGRAPHIC PROJECTIONS



PICTORIAL PRESENTATION IS GIVEN

DRAW FV AND TV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

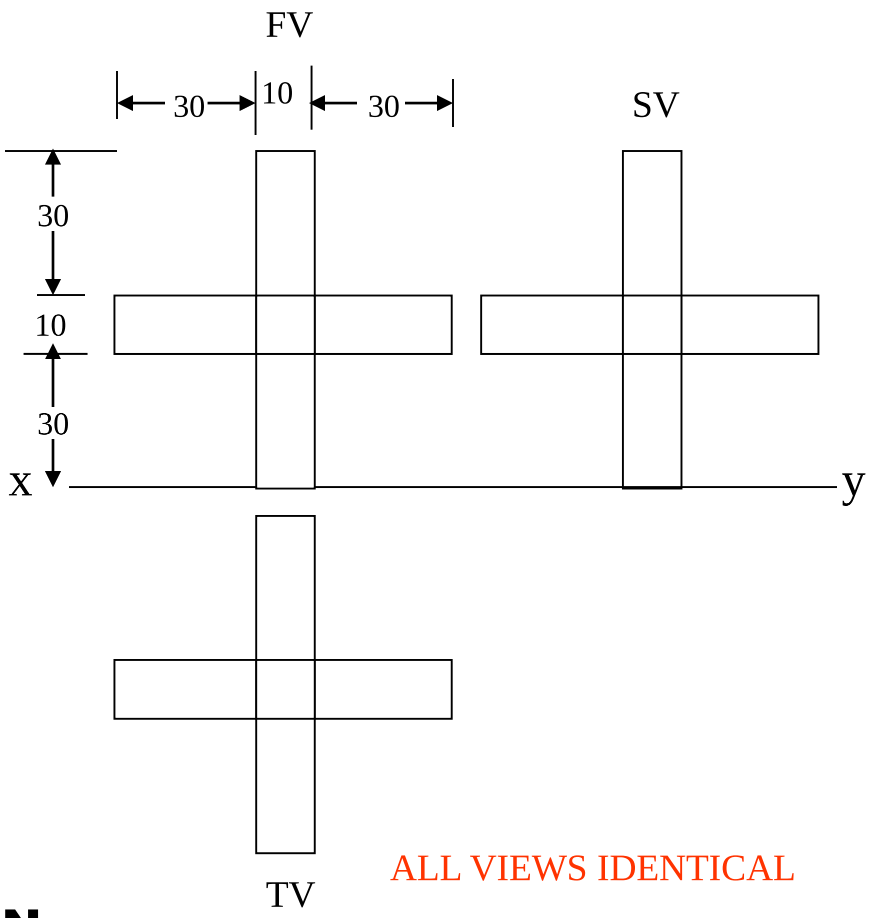
Example-8



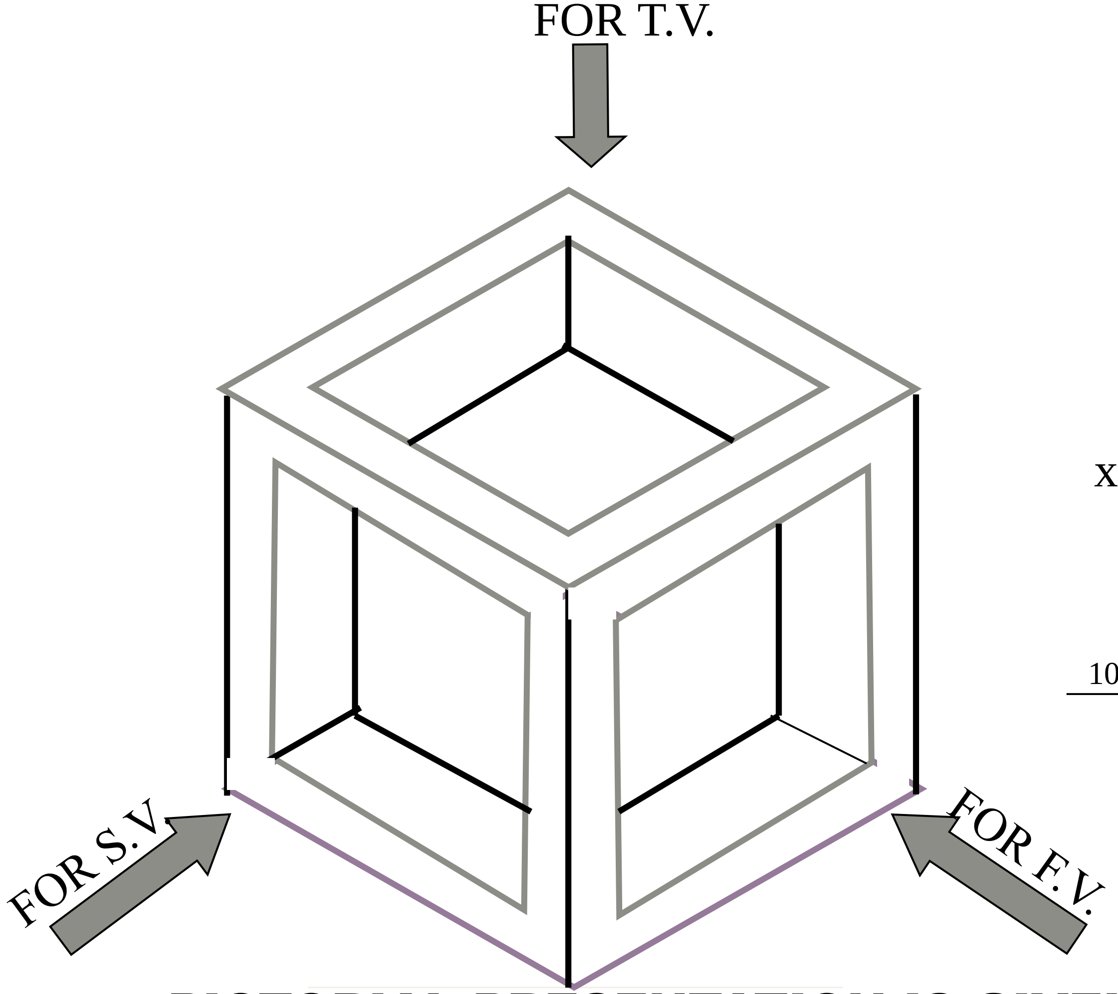
PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

ORTHOGRAPHIC PROJECTIONS

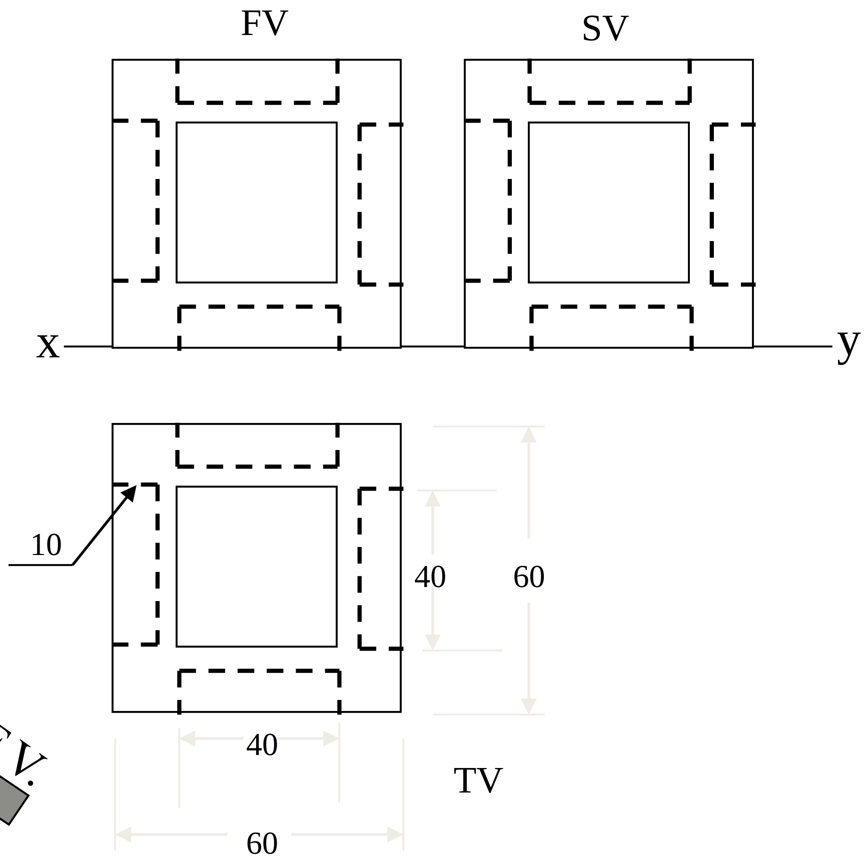


Example-9



ORTHOGRAPHIC PROJECTIONS

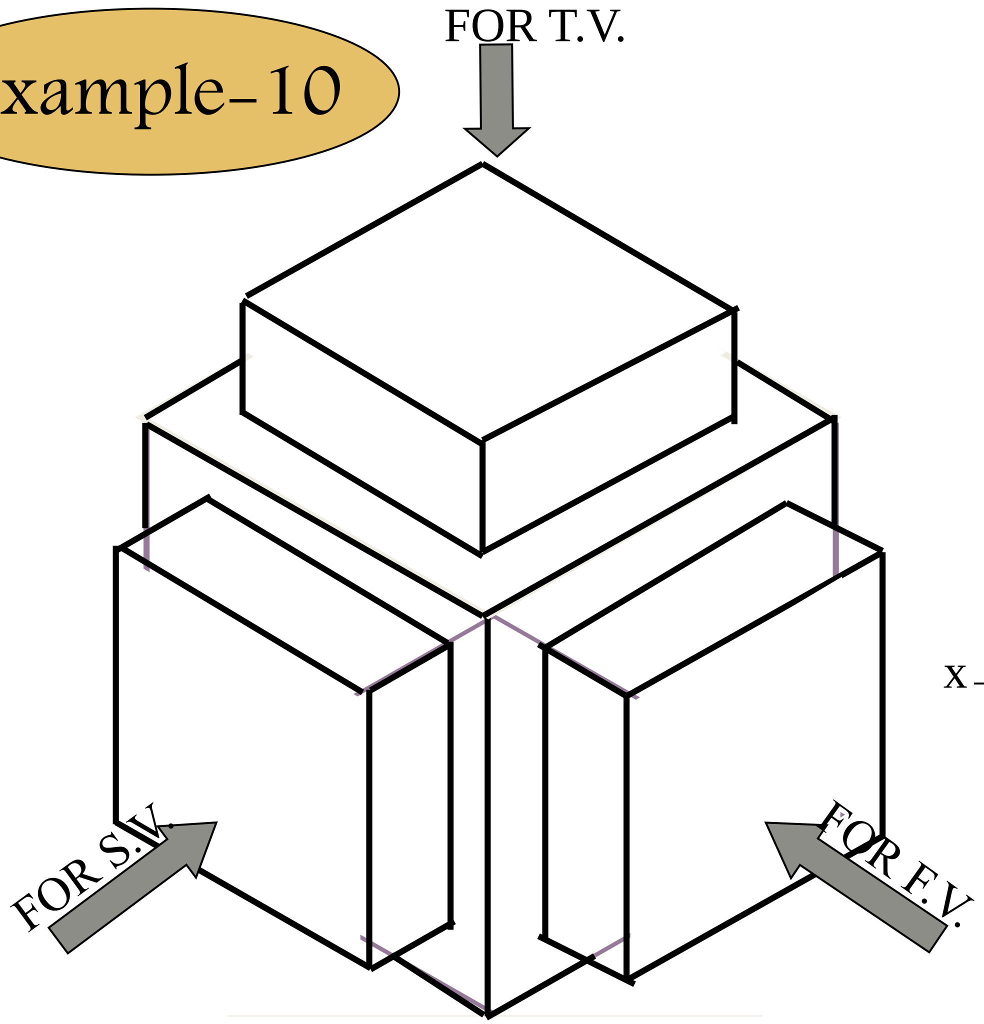
ALL VIEWS IDENTICAL



PICTORIAL PRESENTATION IS GIVEN

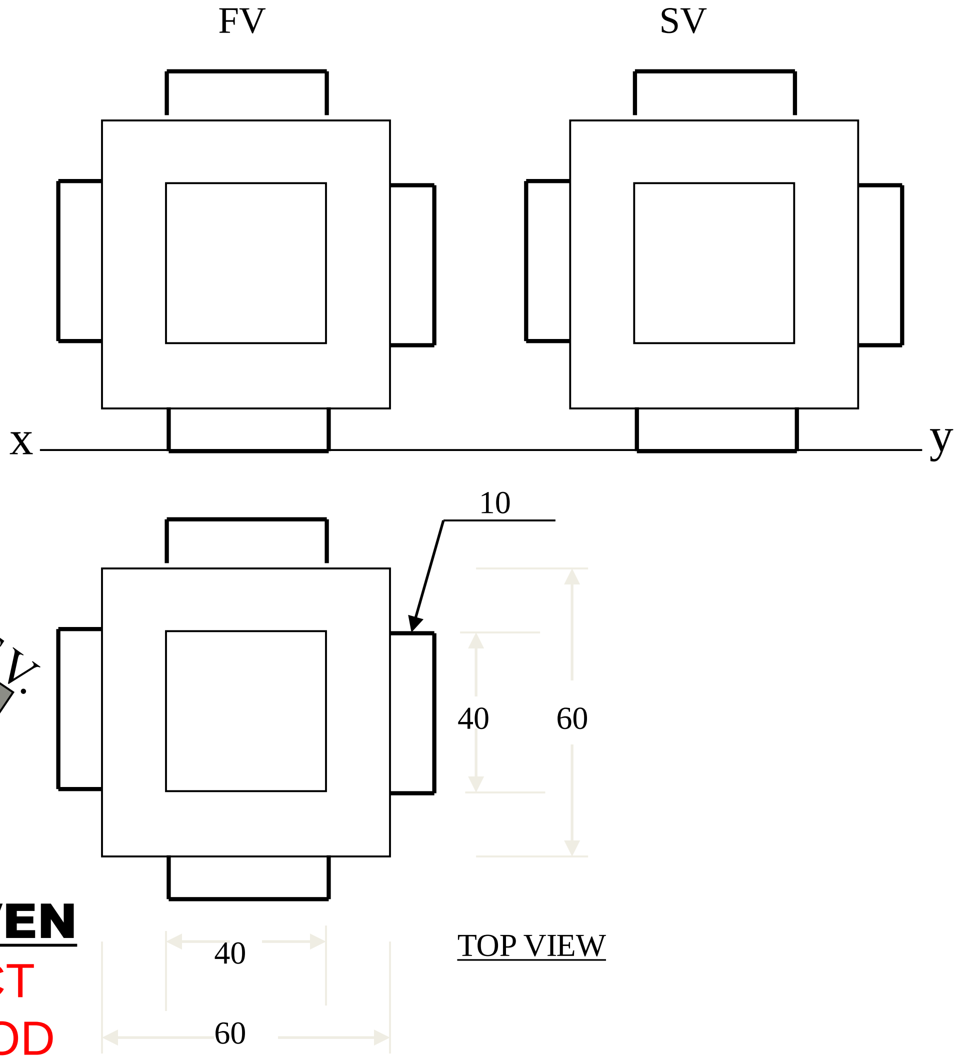
DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

Example-10



ORTHOGRAPHIC PROJECTIONS

ALL VIEWS IDENTICAL



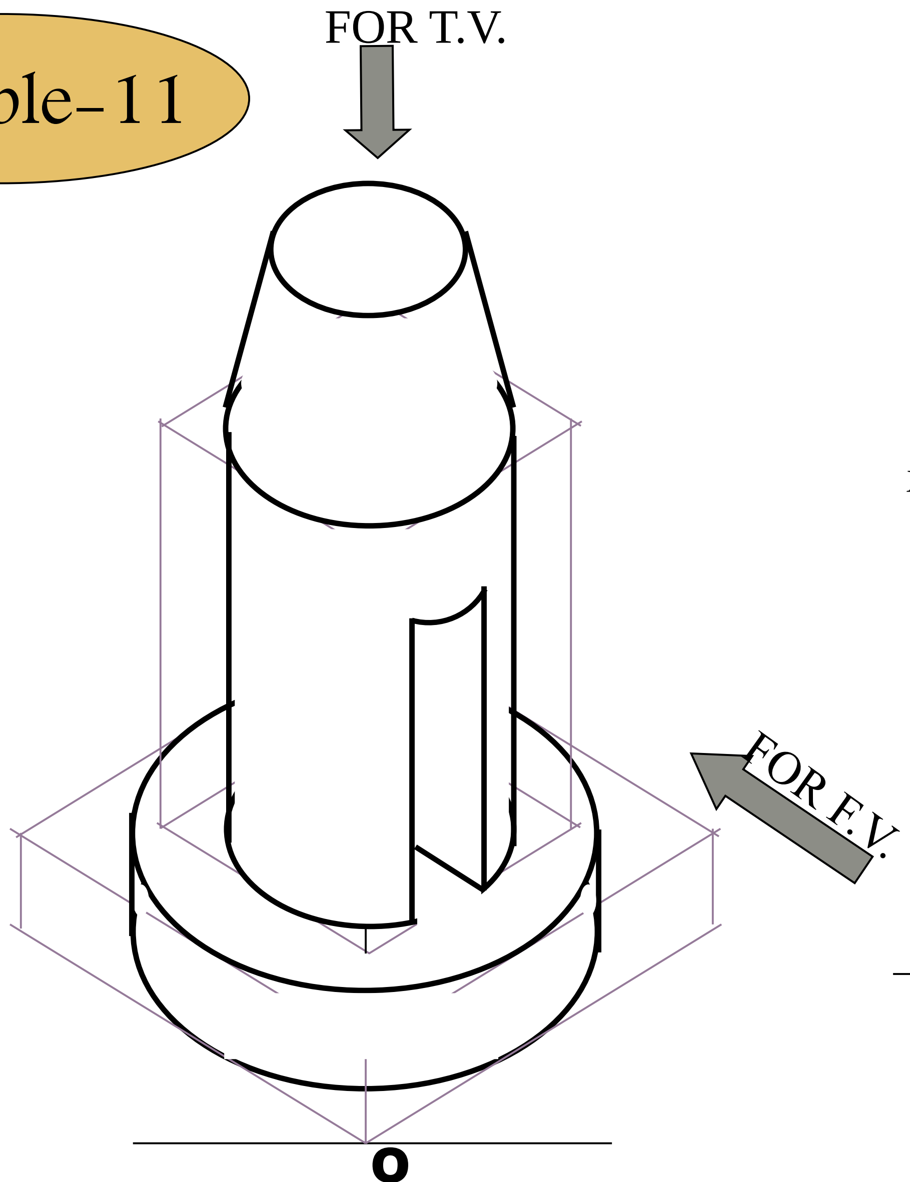
PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

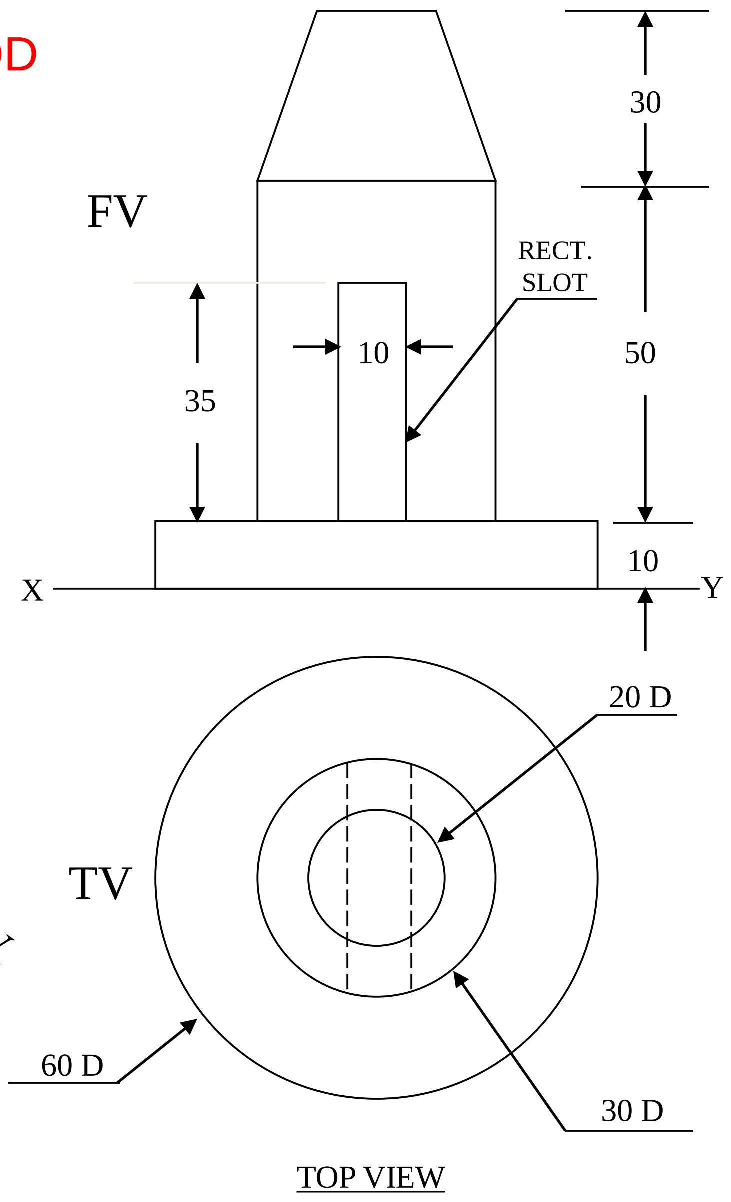
PICTORIAL PRESENTATION IS GIVEN

DRAW FV AND TV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

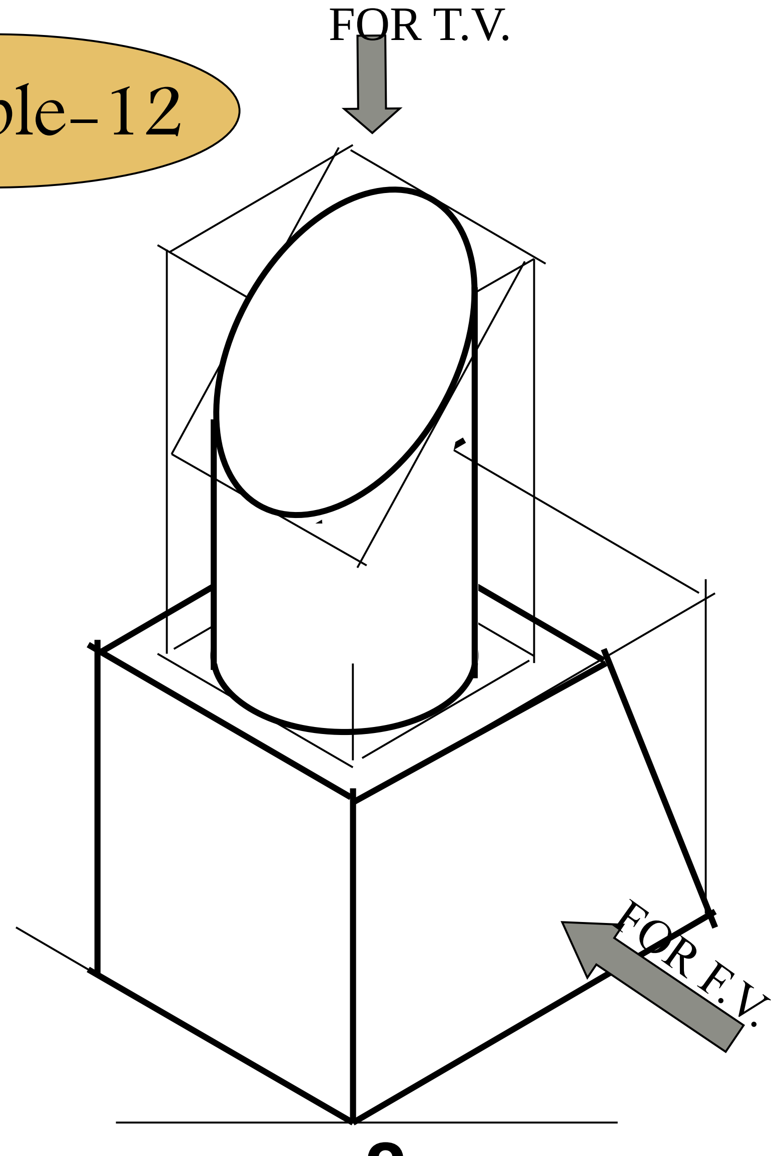
Example-11



ORTHOGRAPHIC PROJECTIONS



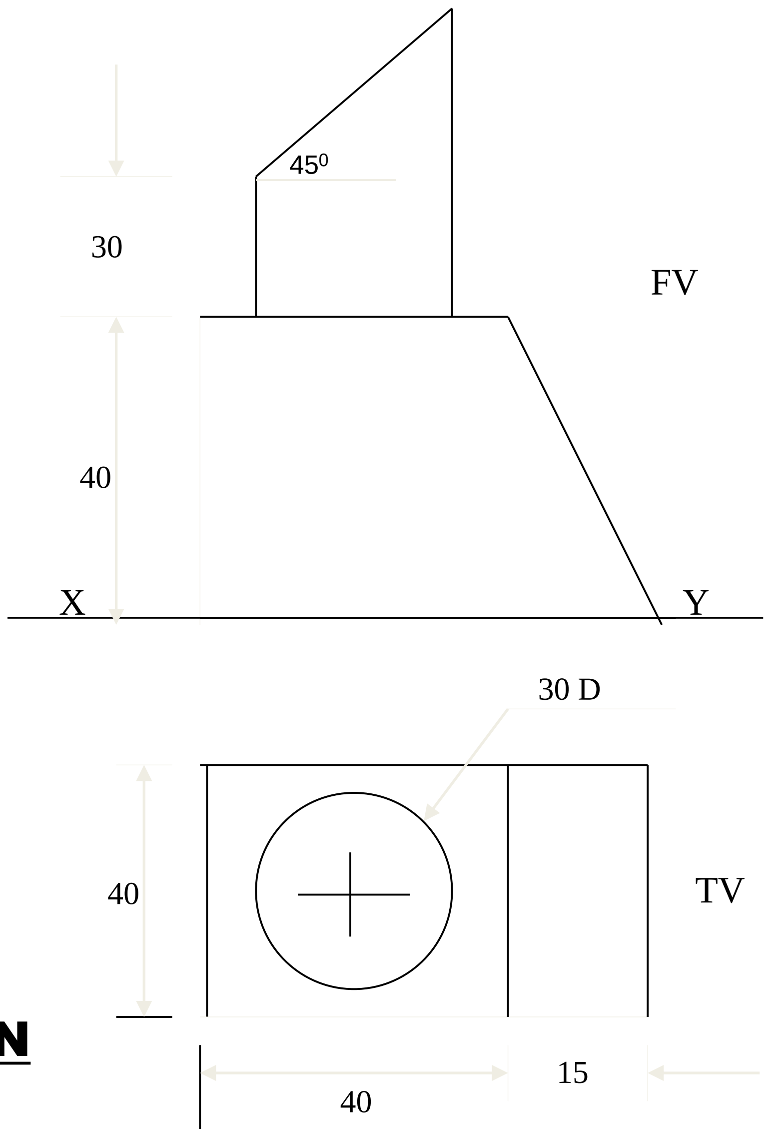
Example-12



PICTORIAL PRESENTATION IS GIVEN

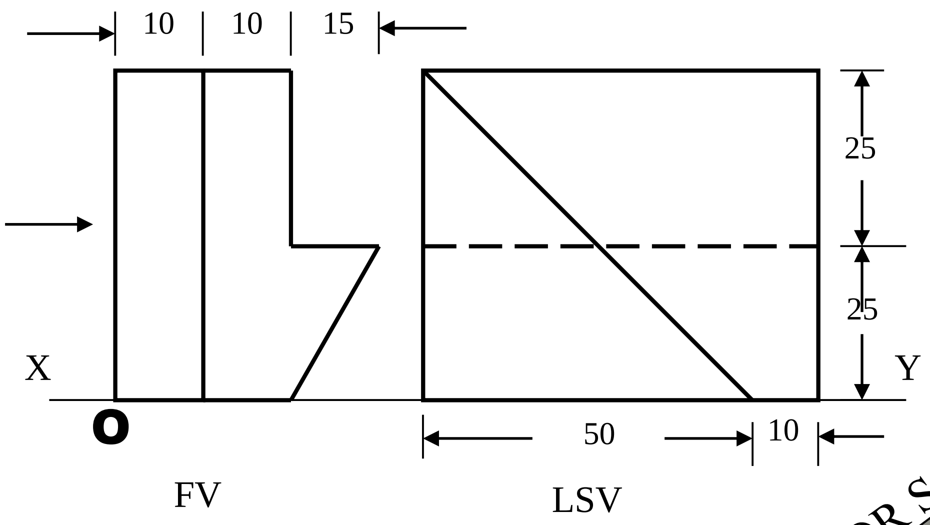
DRAW FV AND TV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

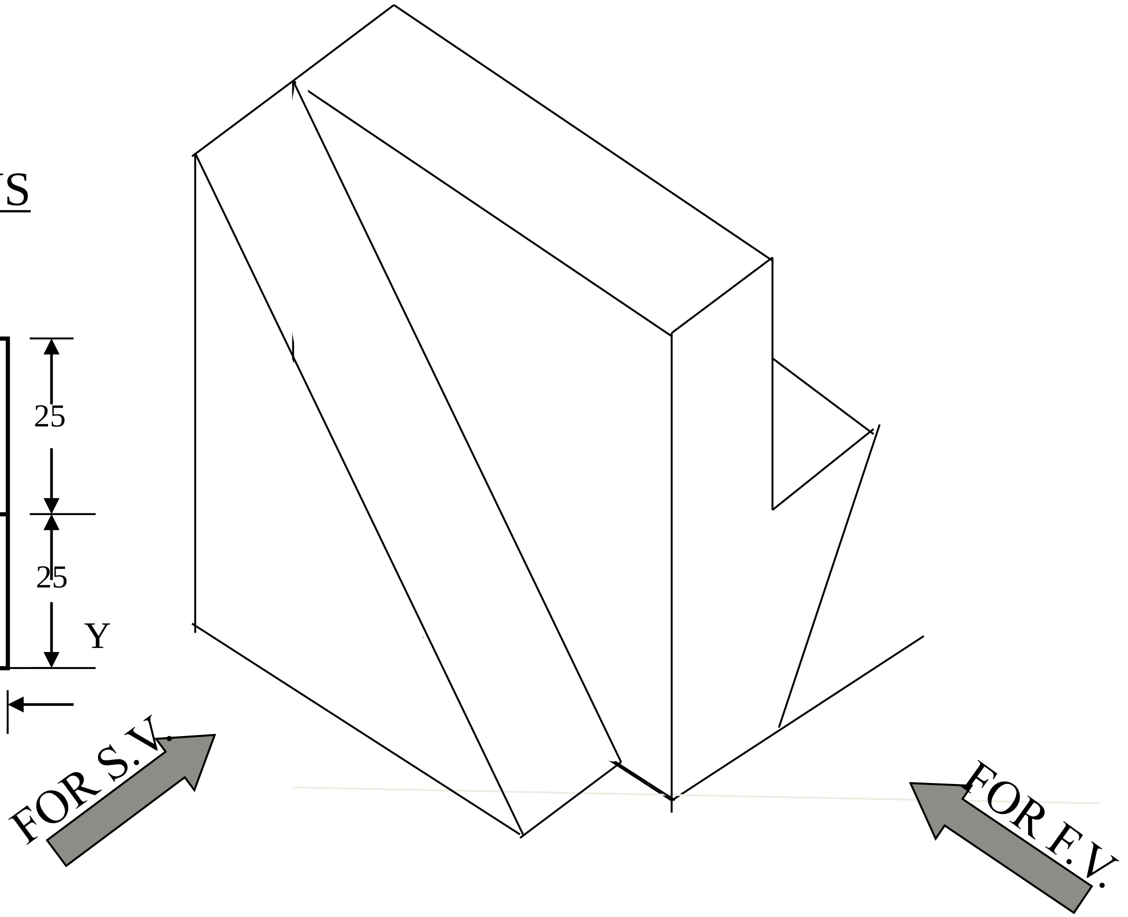
ORTHOGRAPHIC PROJECTIONS



Example-13

ORTHOGRAPHIC PROJECTIONS

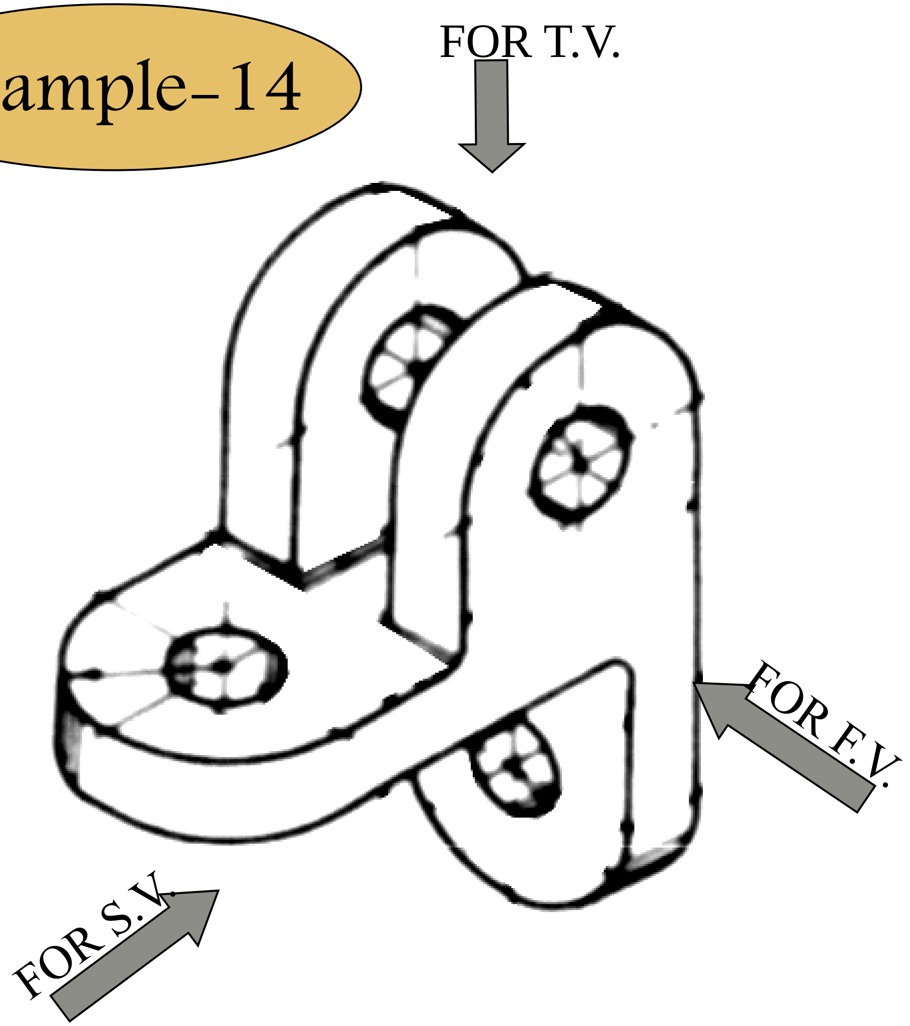




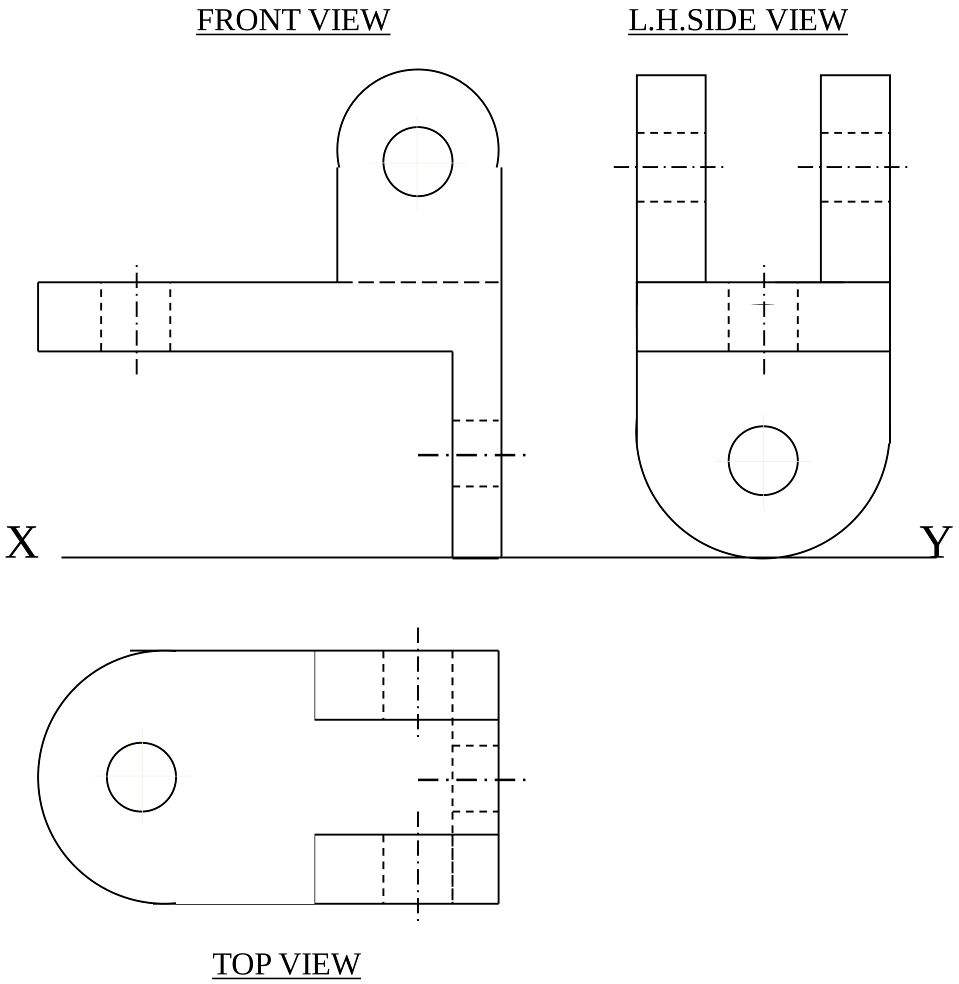
PICTORIAL PRESENTATION IS GIVEN

DRAW FV AND LSV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

Example-14



ORTHOGRAPHIC PROJECTIONS



PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD