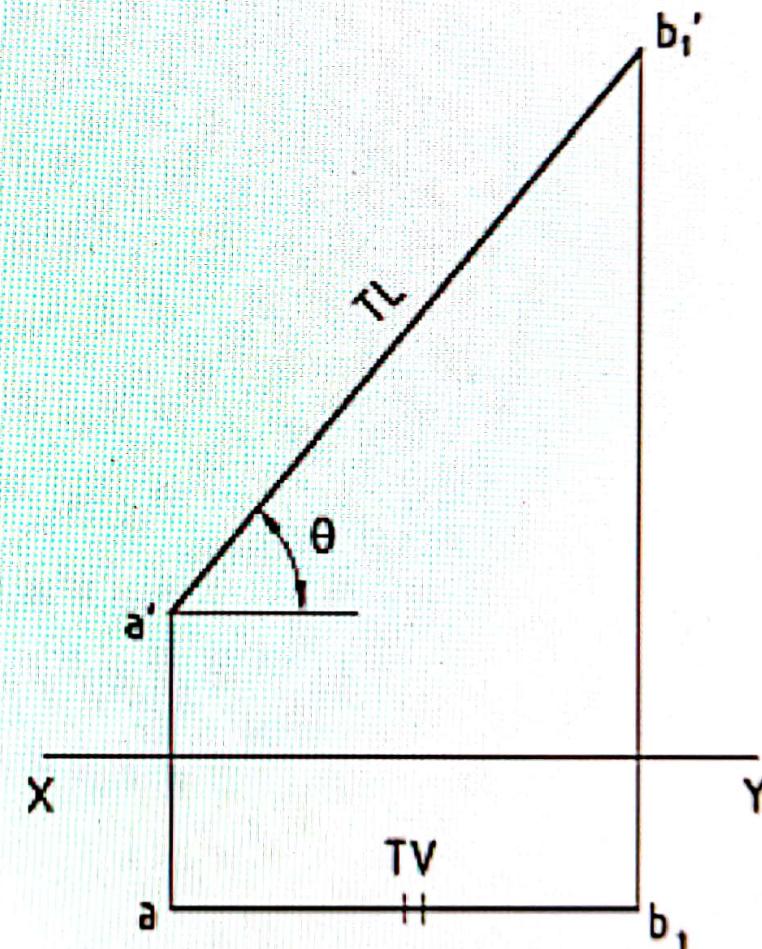


## **Projections of a Line kept inclined to both HP and VP**

- In this position both the top view (TV) and front view (FV) are smaller than true length (TL), so one of the following methods is used to draw the projections.
  - Rotating Line Method
  - Rotating Trapezoidal Plane Method
  - Auxiliary Plane Method

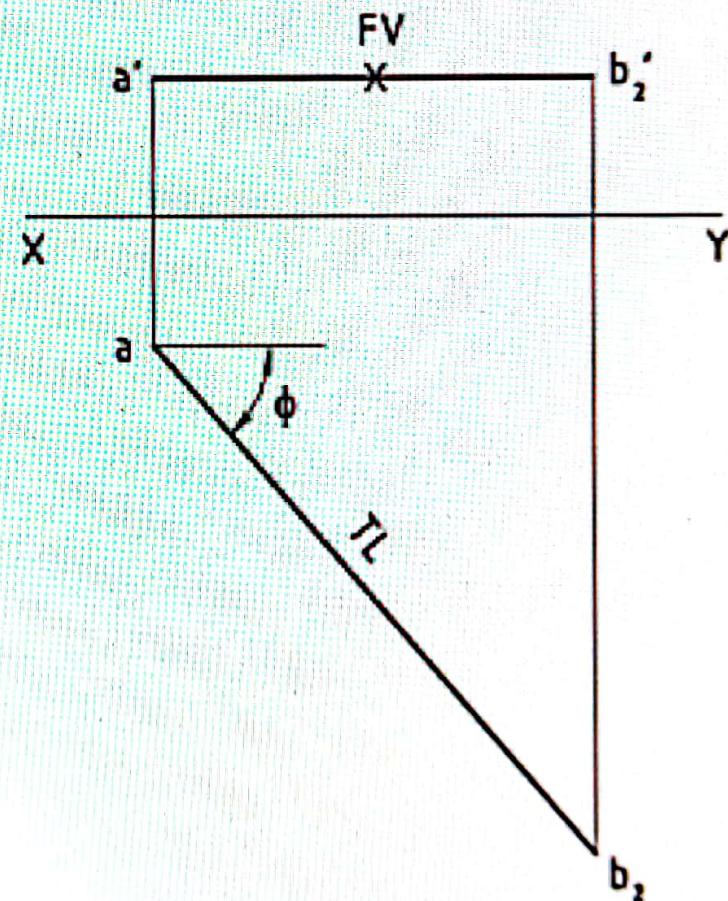
# Rotating Line Method

- This method has 4 steps
- **STEP 1:** Assume the line is kept inclined to HP and parallel to VP, Draw the FV and project the TV as shown in fig.
  - **Note:** Normally any two values of TL,  $\theta$  or TV will be given, draw either the FV or TV and get the other view projected.



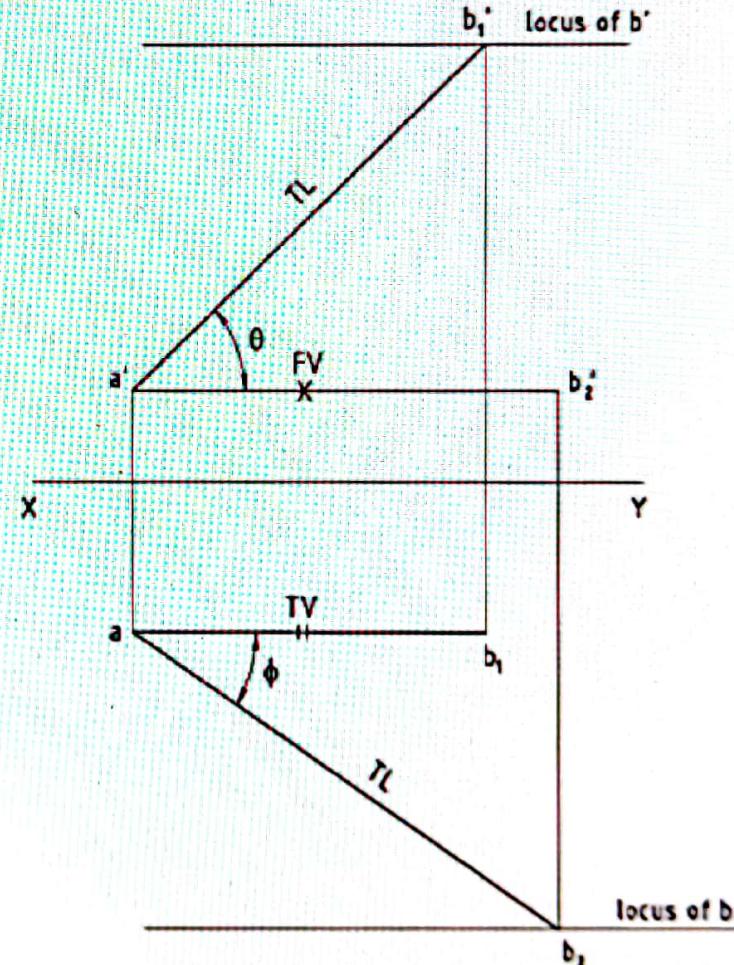
# Rotating Line Method

- STEP 2: Assume the line is kept inclined to VP and parallel to HP, Draw the TV and project the FV as shown in fig.
  - Note: Normally any two values of TL,  $\Phi$  or FV size will be given, draw either the TV or FV and get the other view projected.



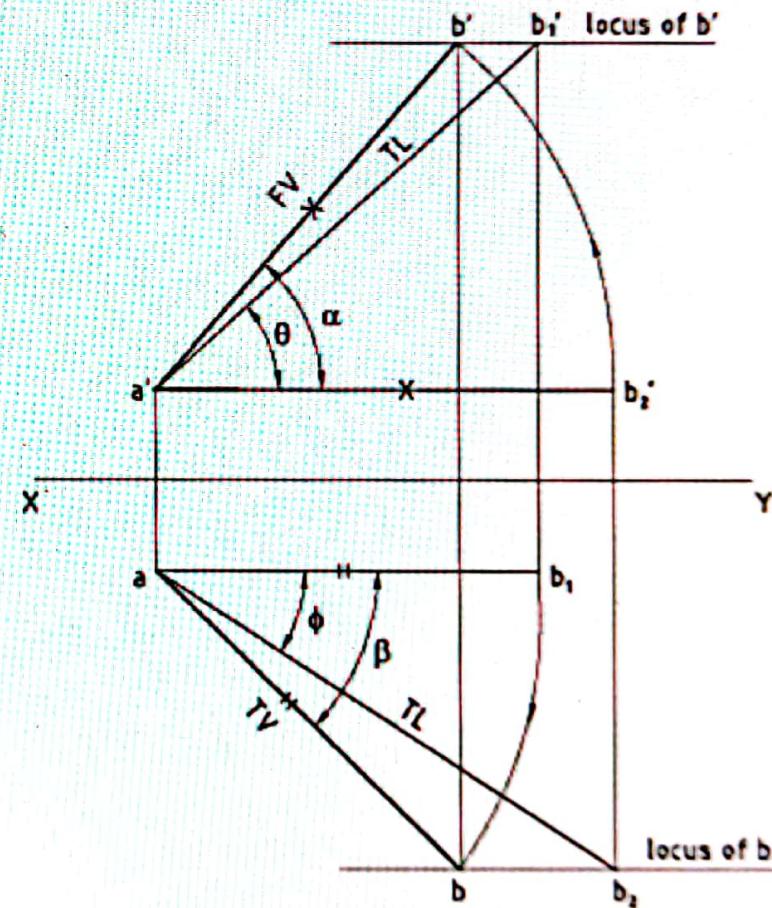
# Rotating Line Method

- STEP 3: Draw the locus of other end of the line in FV and TV as shown in fig.
  - Note: The figures of STEP 1 and STEP 2 are shown together with the locus drawn parallel to XY line.



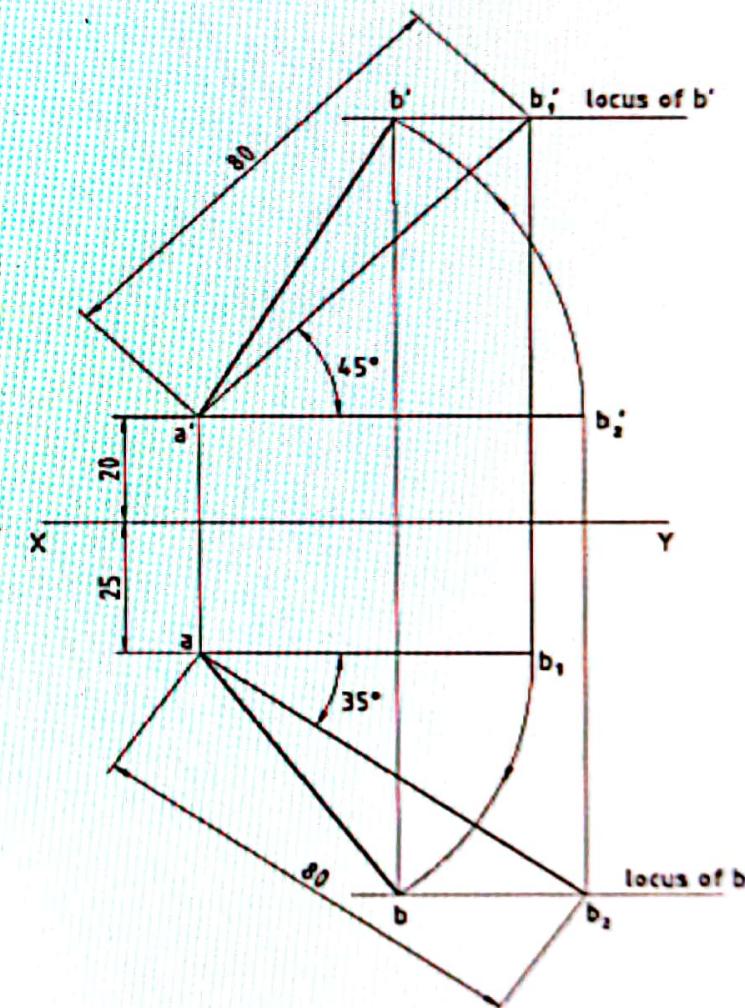
# Rotating Line Method

- **STEP 4:** Rotate TV and FV to the required position with the centre as shown in fig. Complete the TV and FV by drawing dark lines.
  - Also show the projector of the other end of the line which is at  $90^\circ$  to the XY line for correct answer.



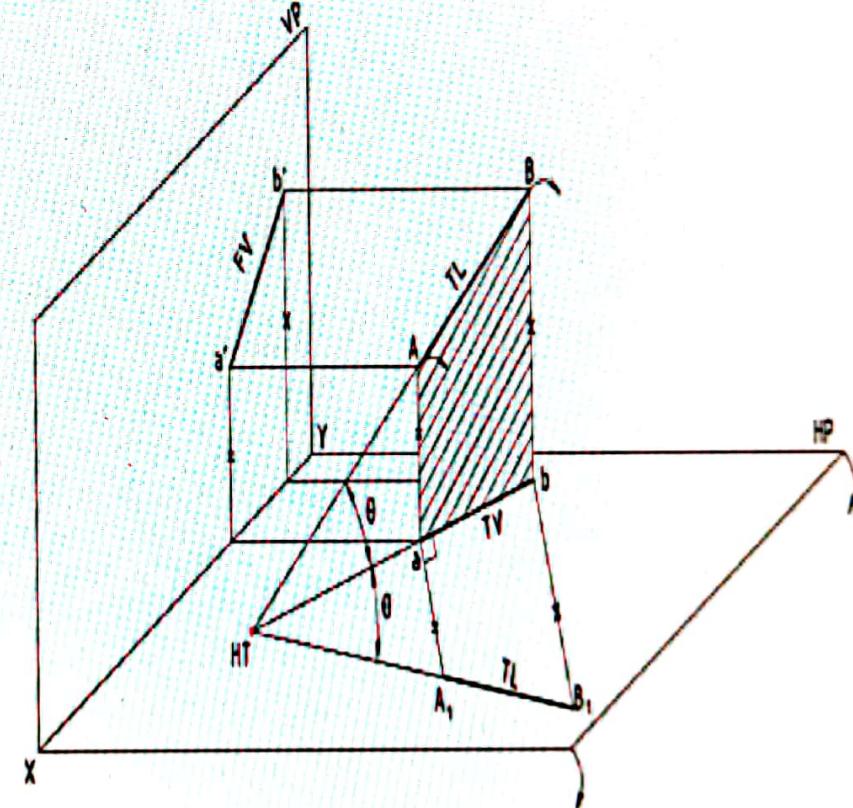
**Example 1:** A line AB 80mm long has its end A 20mm above HP and 25mm in front of VP. The line is inclined at  $45^\circ$  to HP and  $35^\circ$  to VP. Draw its projections.

- Draw the XY line and mark the projections of end A of the line.
- **Step 1:** Draw FV using TL and  $\theta$ . Project the TV.
- **Step 2:** Draw TV using TL and  $\Phi$ . Project the FV.
- **Step 3:** Draw locus of  $b'$  and  $b$ .
- **Step 4:** Rotate the TV and FV to the required position on locus.
  - **Note:** These 4 steps are used to solve a given problem in any sequence as per the given data.



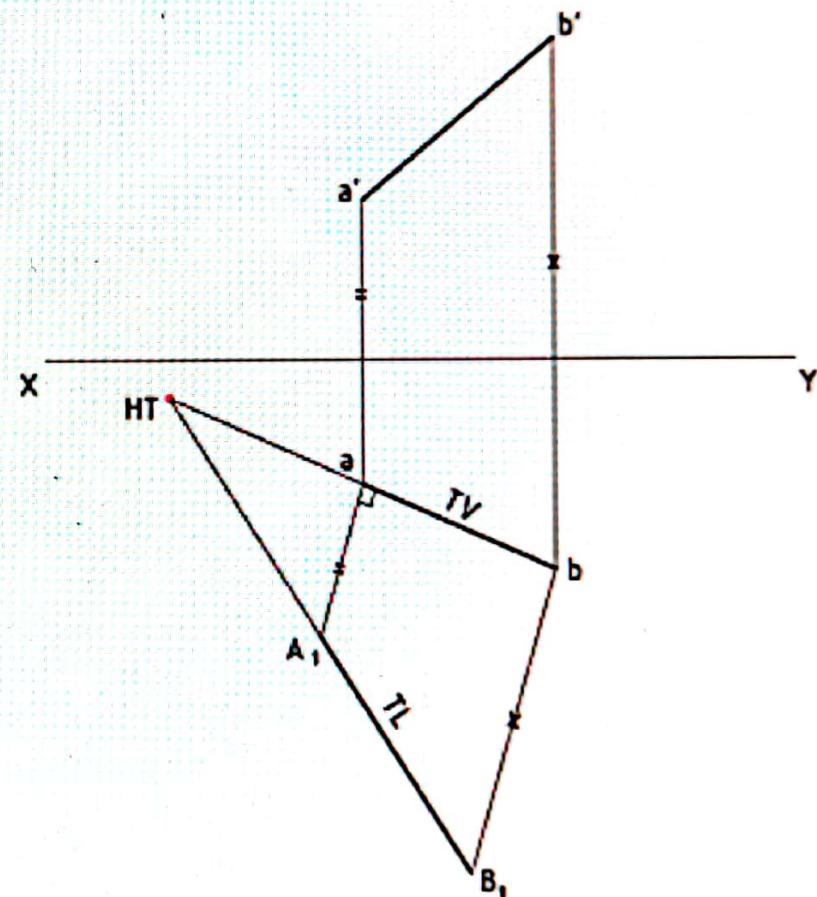
# Rotating Trapezoidal Plane Method

- This method assumes trapezoidal planes to draw the projections of the straight line.
- Consider a trapezoidal plane which contains the straight line in space and top view of the line as shown in Fig.



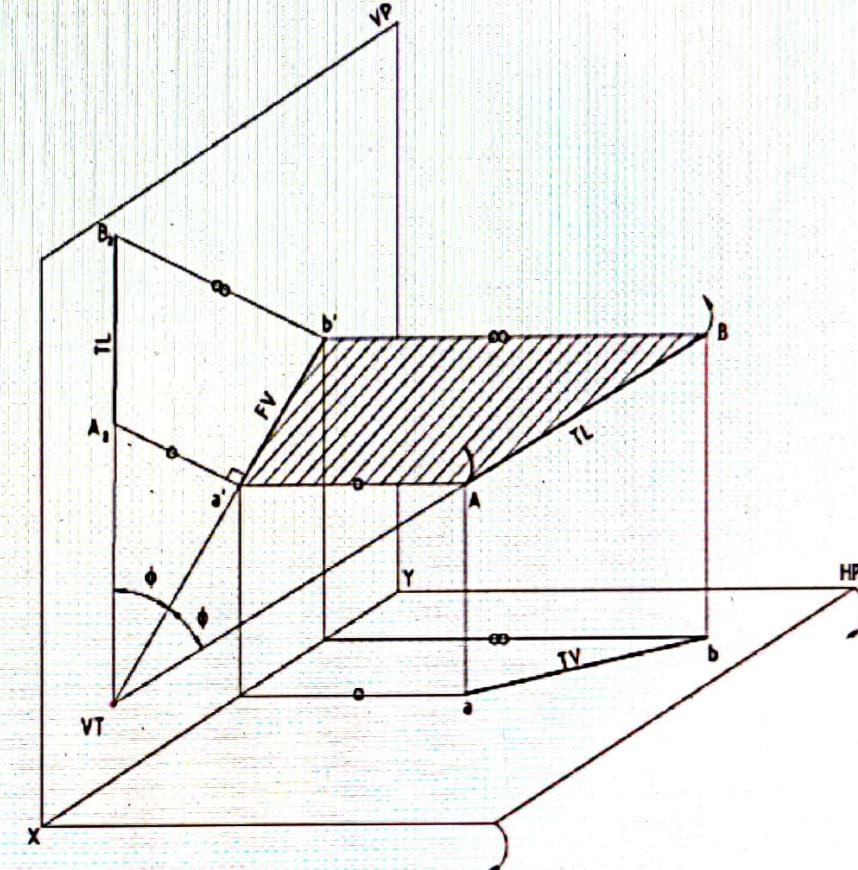
# Rotating Trapezoidal Plane Method

- Rotate this trapezoidal plane and put it on HP.
- Note that the true shape of this plane is seen in top view which can be constructed by using measurements from the front view of the ends of the line from XY line as shown in fig.



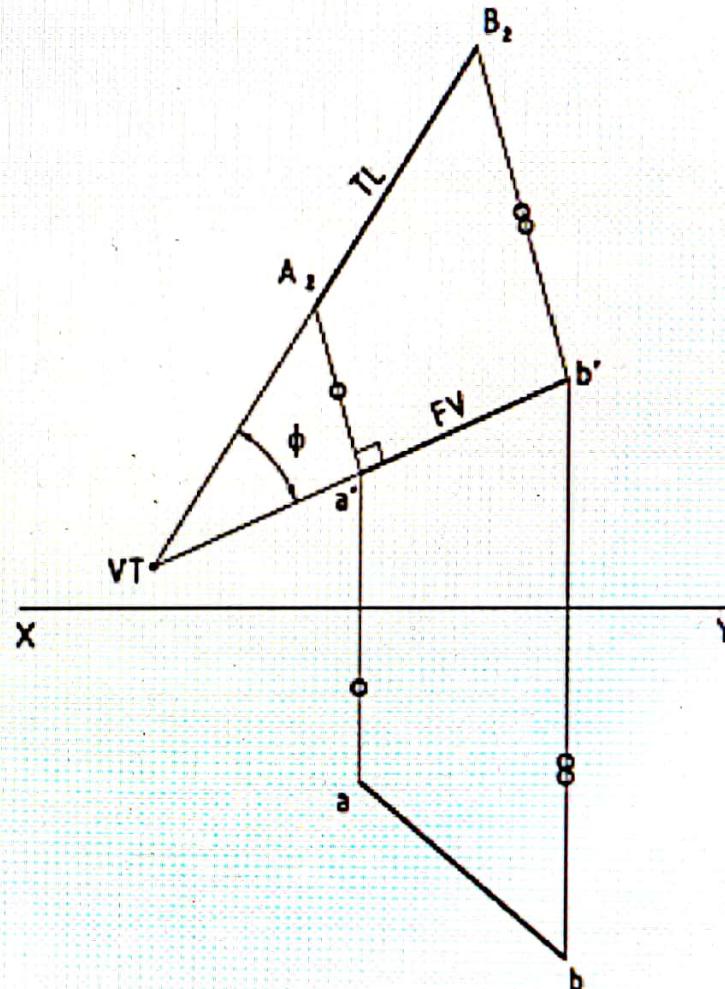
# Rotating Trapezoidal Plane Method

- Consider another trapezoidal plane which contains the straight line in space and front view of the line as shown in Fig.



# Rotating Trapezoidal Plane Method

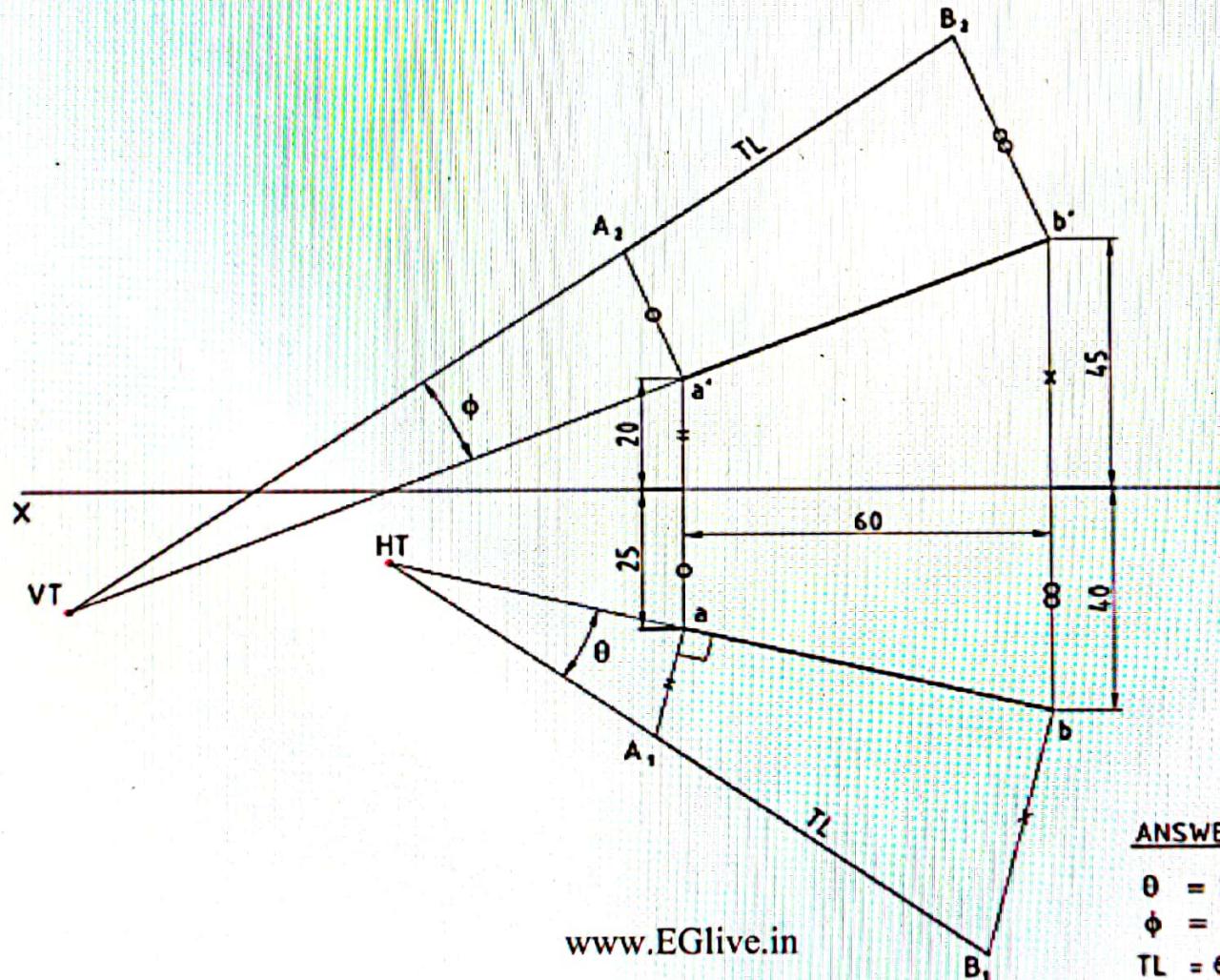
- Rotate this trapezoidal plane and put it on VP.
- Note that the true shape of this plane is seen in front view which can be constructed by using measurements from the top view of the ends of the line from XY line as shown in fig.



**Example 2:** A line AB has its end A 20mm above HP and 25mm in front of VP. The other end B is 45mm above HP and 40mm in front of VP. The distance between end projectors is 60mm. Draw its projections. Also find the true length, true inclinations of the line with HP and VP and mark the traces.

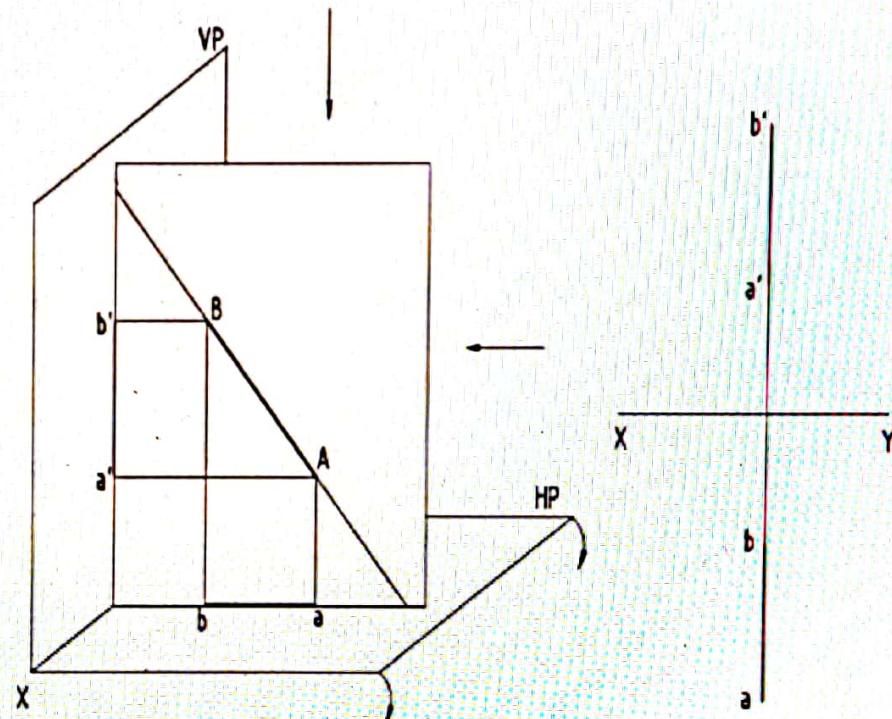
- Draw the XY line and mark the projections of the end A of the line. Also draw the projections of the other end B of the line.
- Construct the trapezoidal plane in top view using measurements from the front view of the ends of the line from XY line as shown in fig.
- Extend the TL and TV to get HT and  $\theta$ .

- Construct another trapezoidal plane in front view using measurements from the top view of the ends of the line from XY line as shown in fig.
- Extend the TL and FV to get VT and  $\Phi$ .



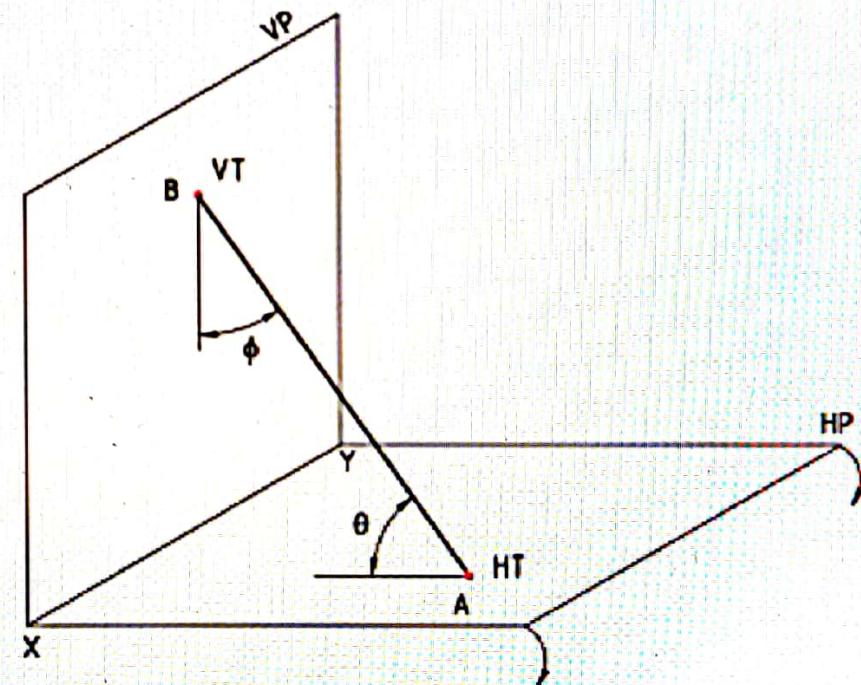
# Important special Case Problems

- The straight line is placed such a way that the sum of its inclinations with HP and VP is equal to  $90^\circ$  (i.e.  $\theta + \phi = 90^\circ$ )
- Note:** Use the 4 steps of rotating line method.
- Also note that the final projections (TV & FV) are obtained perpendicular to HP and VP.



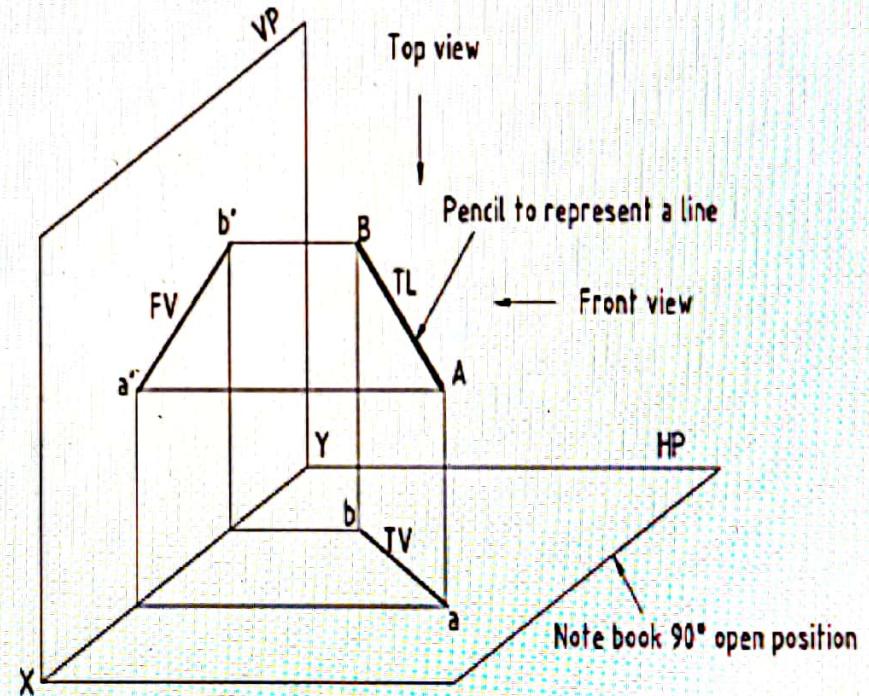
# Important special Case Problems

- The straight line is placed such a way that one end of the line is in HP and another end in VP.
- Note: Use the 4 steps of rotating line method but drawn separately.
- Also note that the final projections are obtained using the top and front view sizes from step 1 and step 2.



# Tips to solve problems

- Use your notebook in open position as VP and HP and pencil as straight line to understand the given position and its projections.



# Tips to solve problems

- Have thorough knowledge of problems when a line is kept inclined to one plane and parallel to other plane.
- Familiarize with the 4 steps of Rotating line method.
- Steps (1) to (4) can be done in any order to draw projections of the line.