PROJECTIONS OF PLANES

In this topic various plane figures are the objects.

What is usually asked in the problem?

To draw their projections means F.V, T.V. & S.V.

What will be given in the problem?

1. Description of the plane figure.
2. It's position with HP and VP.

In which manner it's position with HP & VP will be described?

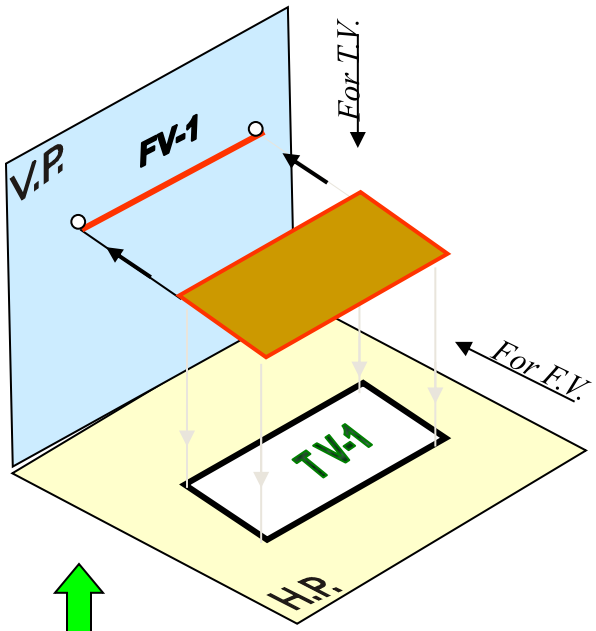
1. **Inclination of it's SURFACE with one of the reference planes will be given.**
2. Inclination of one of it's EDGES with other reference plane will be given

(Hence this will be a case of an object inclined to both reference Planes.)

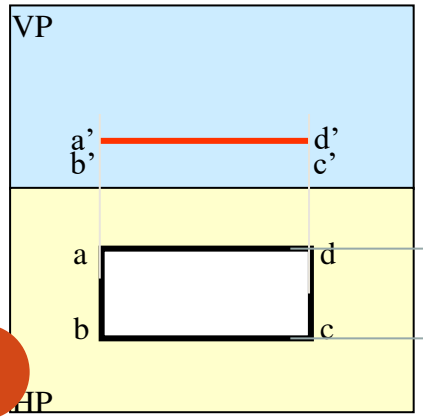
Study the illustration showing surface & side inclination given on next page.

CASE OF A RECTANGLE – OBSERVE AND NOTE ALL STEPS.

SURFACE **PARALLEL** TO HP
PICTORIAL PRESENTATION

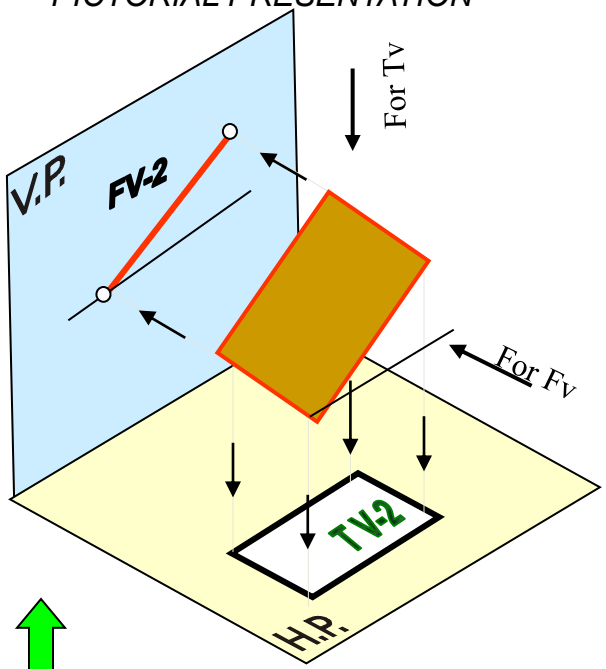


ORTHOGRAPHIC
TV-True Shape
FV- Line // to xy

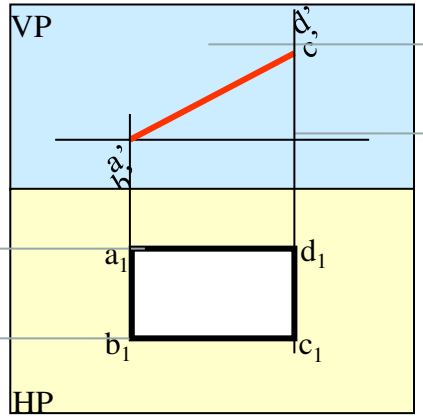


A

SURFACE **INCLINED** TO HP
PICTORIAL PRESENTATION

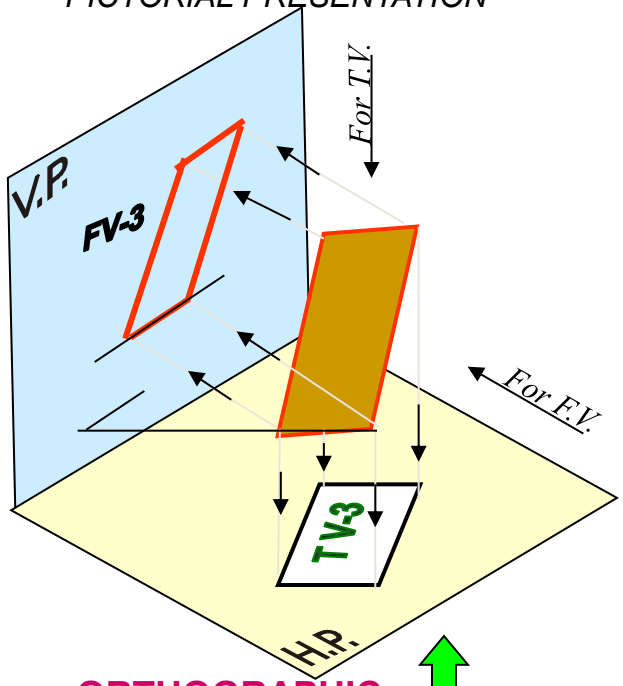


ORTHOGRAPHIC
FV- Inclined to XY
TV- Reduced Shape

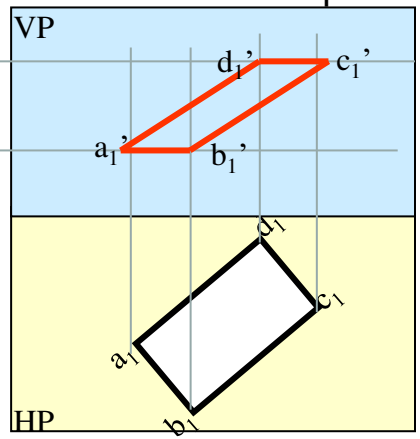


B

ONE SMALL SIDE INCLINED TO VP
PICTORIAL PRESENTATION



ORTHOGRAPHIC
FV- Apparent Shape
TV-Previous Shape



C

PROCEDURE OF SOLVING THE PROBLEM:

IN THREE STEPS EACH PROBLEM CAN BE SOLVED:(As Shown In Previous Illustration)

STEP 1. Assume suitable conditions & draw Fv & Tv of initial position.

STEP 2. Now consider surface inclination & draw 2nd Fv & Tv.

STEP 3. After this,consider side/edge inclination and draw 3rd (final) Fv & Tv.

ASSUMPTIONS FOR INITIAL POSITION:

(Initial Position means assuming surface // to HP or VP)

1.If in problem surface is inclined to HP – assume it // HP

Or If surface is inclined to VP – assume it // to VP

2. Now if surface is assumed // to HP- It's TV will show True Shape.

And If surface is assumed // to VP – It's FV will show True Shape.

3. Hence begin with drawing TV or FV as True Shape.

4. While drawing this True Shape –

keep one side/edge (which is making inclination) perpendicular to xy line

(similar to pair no. A on previous page illustration).

Now Complete STEP 2. By making surface inclined to the resp plane & project it's other view.

(Ref. 2nd pair B on previous page illustration)

Now Complete STEP 3. By making side inclined to the resp plane & project it's other view.

(Ref. 3nd pair C on previous page illustration)

APPLY SAME STEPS TO SOLVE NEXT *ELEVEN* PROBLEMS

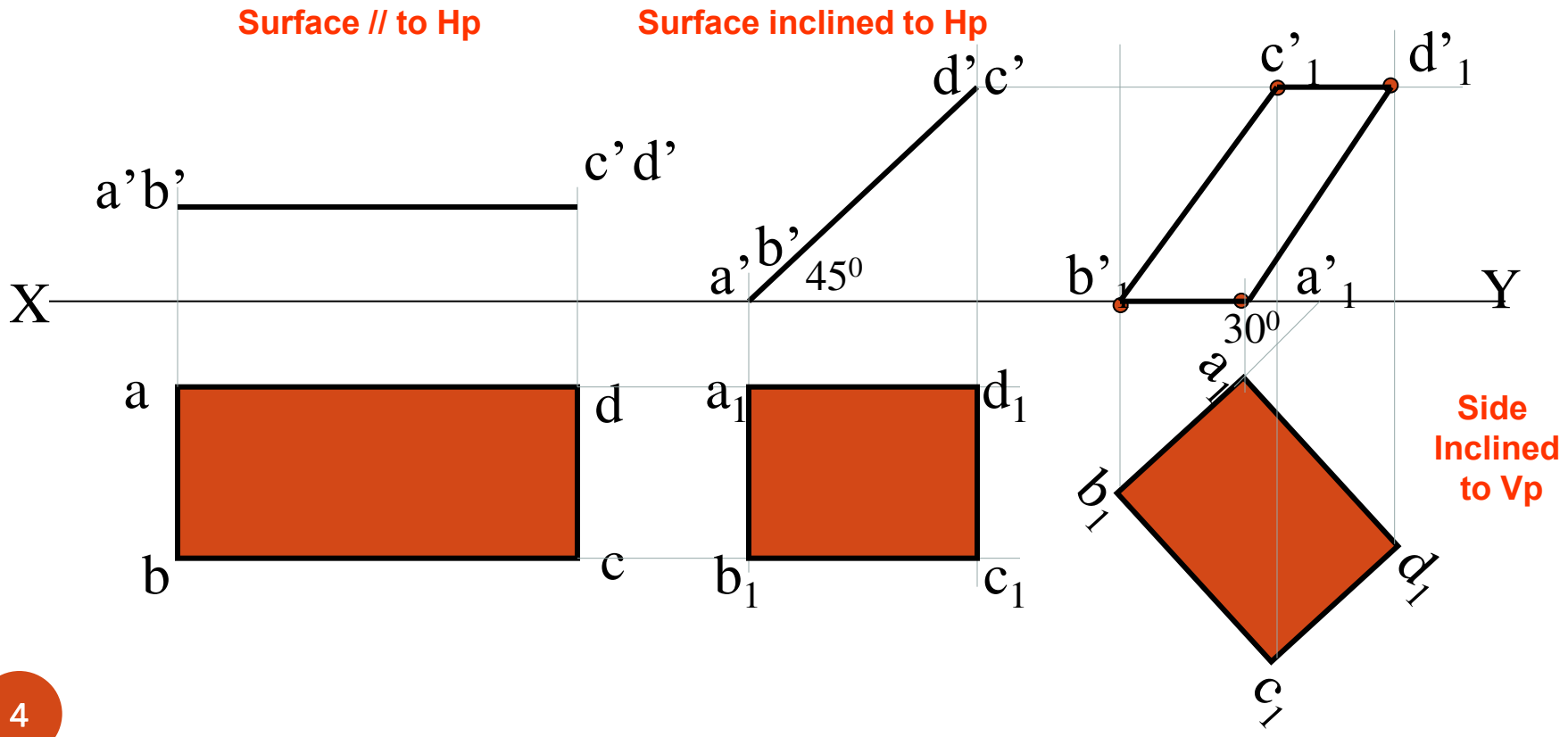
Problem 1:

Rectangle 30mm and 50mm sides is resting on HP on one small side which is 30^0 inclined to VP, while the surface of the plane makes 45^0 inclination with HP. Draw it's projections.

Read problem and answer following questions

1. Surface inclined to which plane? ------- HP
2. Assumption for initial position? ------// to HP
3. So which view will show True shape? --- TV
4. Which side will be vertical? ---One small side.

Hence begin with TV, draw rectangle below X-Y drawing one small side vertical.

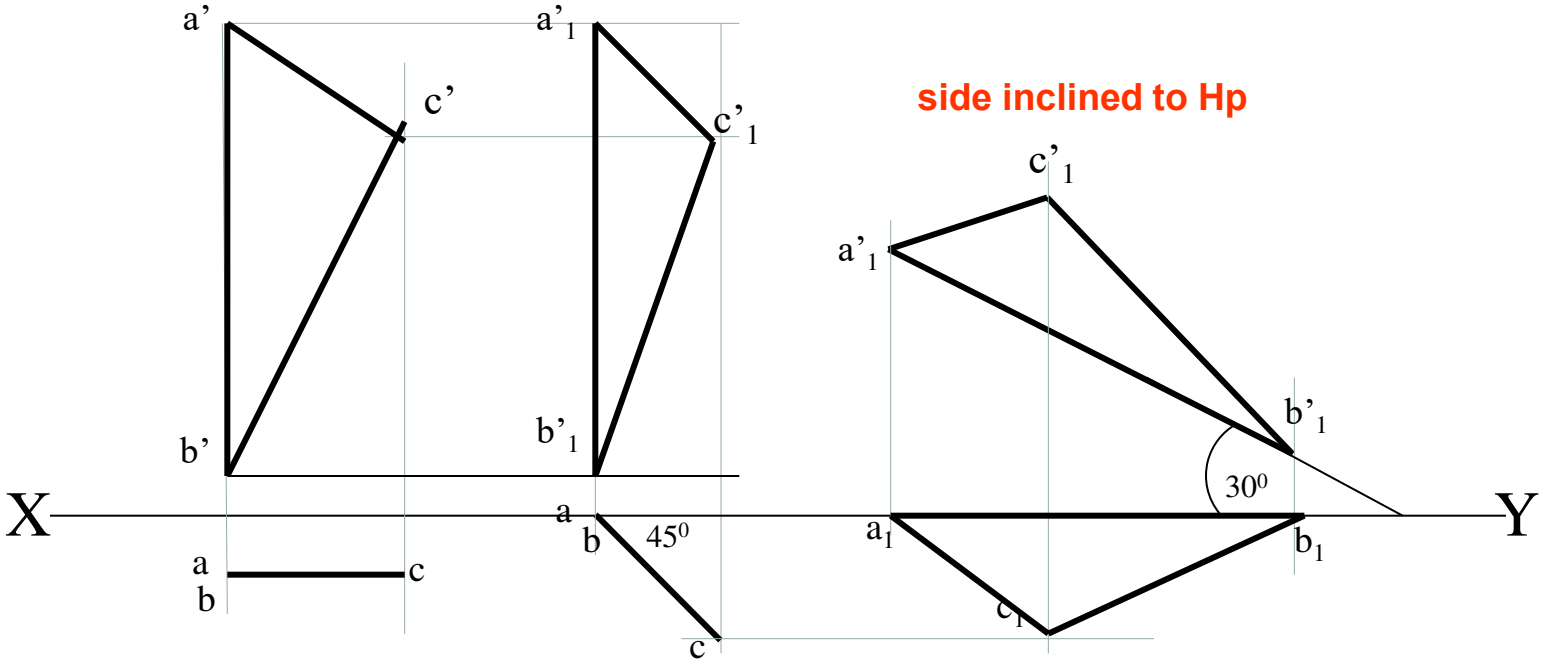


Problem 2:
A $30^0 - 60^0$ set square of longest side 100 mm long, is in VP and 30^0 inclined to HP while it's surface is 45^0 inclined to VP.Draw it's projections

(Surface & Side inclinations directly given)

Read problem and answer following questions
1 .Surface inclined to which plane? ------- VP
2. Assumption for initial position? ------// to VP
3. So which view will show True shape? --- FV
4. Which side will be vertical? ------longest side.

Hence begin with FV, draw triangle above X-Y keeping longest side vertical.



Surface // to Vp **Surface inclined to Vp**

Problem 3:

A $30^0 – 60^0$ set square of longest side 100 mm long is in VP and it's surface 45^0 inclined to VP. One end of longest side is 10 mm and other end is 35 mm above HP. Draw it's projections

(Surface inclination directly given. Side inclination indirectly given)

Read problem and answer following questions

1 .Surface inclined to which plane? ------- VP

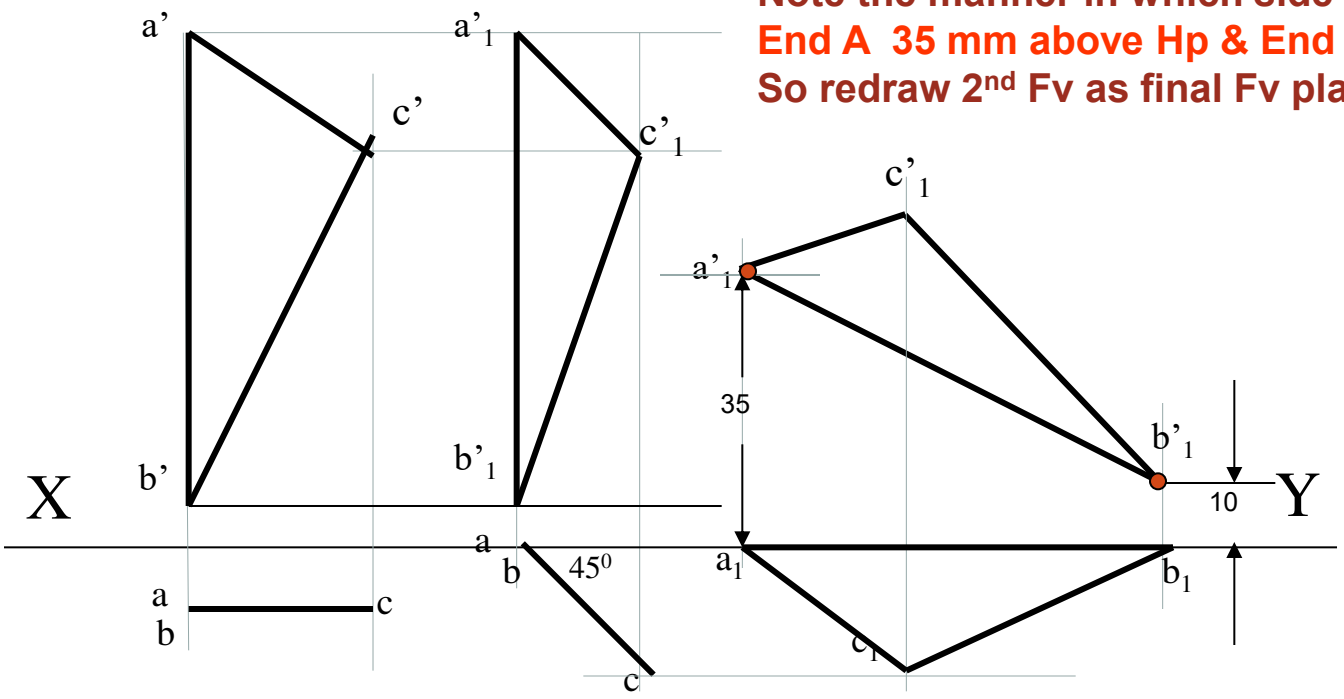
2. Assumption for initial position? ------// to VP

3. So which view will show True shape? --- FV

4. Which side will be vertical? ------longest side.

Hence begin with FV, draw triangle above X-Y keeping longest side vertical.

First TWO steps are similar to previous problem.
Note the manner in which side inclination is given.
End A 35 mm above Hp & End B is 10 mm above Hp.
So redraw 2nd Fv as final Fv placing these ends as said.



Problem 4:

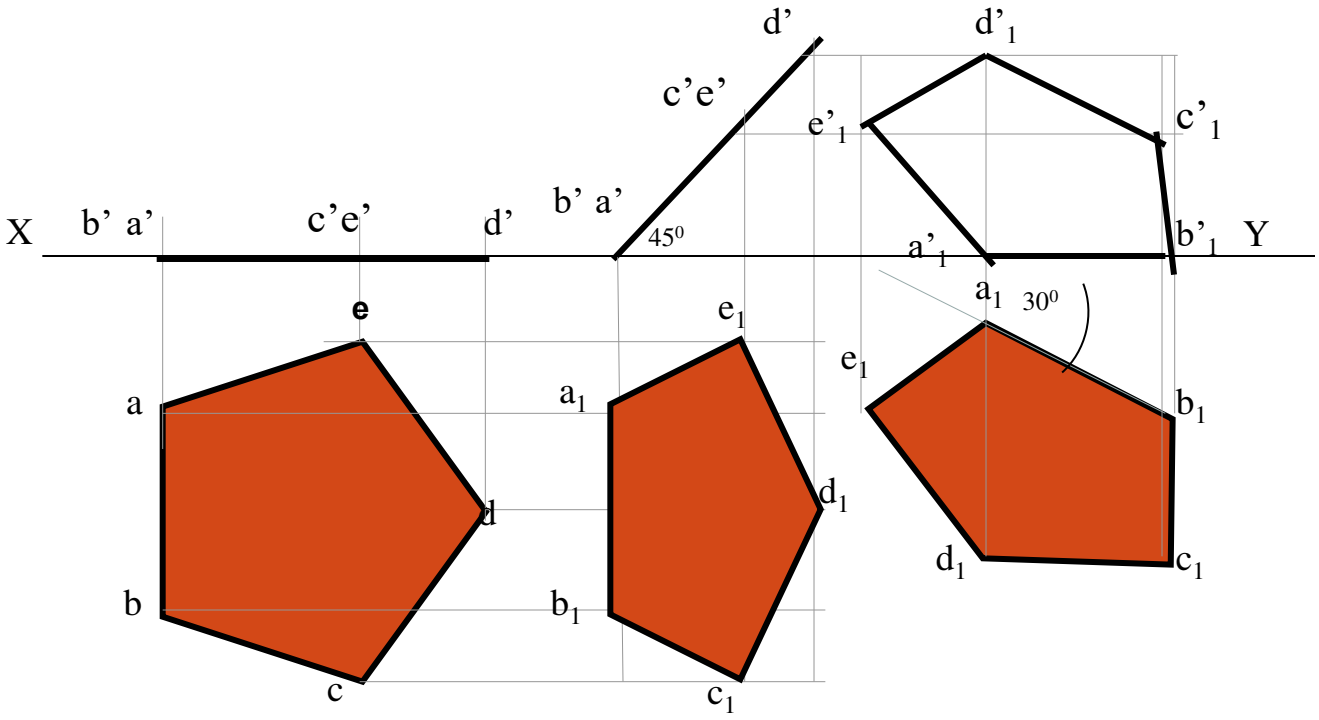
A regular pentagon of 30 mm sides is resting on HP on one of it's sides with it's surface 45^0 inclined to HP.
Draw it's projections when the side in HP makes 30^0 angle with VP

SURFACE AND SIDE INCLINATIONS ARE DIRECTLY GIVEN.

Read problem and answer following questions

1. Surface inclined to which plane? ------- ***HP***
2. Assumption for initial position? ------ ***// to HP***
3. So which view will show True shape? --- ***TV***
4. Which side will be vertical? -------- ***any side.***

Hence begin with TV,draw pentagon below X-Y line, taking one side vertical.



Problem 5:

A regular pentagon of 30 mm sides is resting on HP on one of it's sides while it's opposite vertex (corner) is 30 mm above HP.
Draw projections when side in HP is 30^0 inclined to VP.

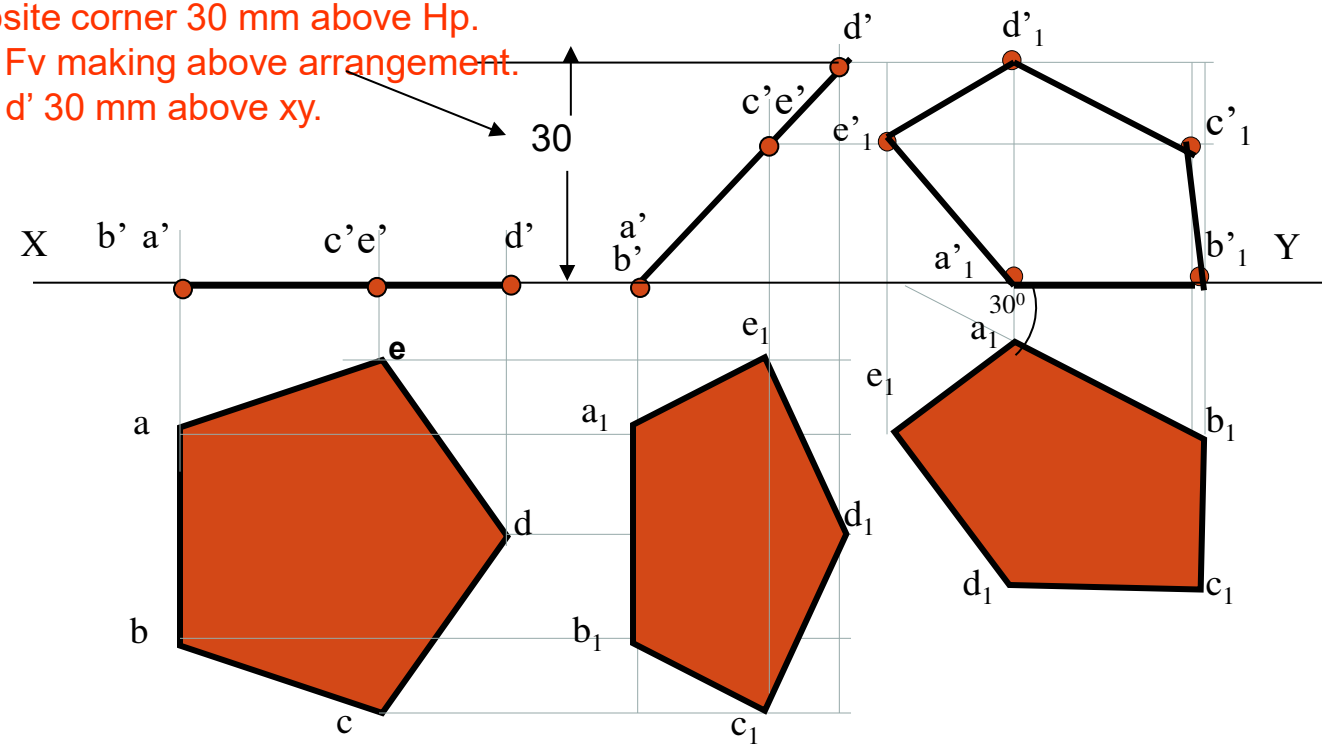
Read problem and answer following questions

1. Surface inclined to which plane? ------- ***HP***
2. Assumption for initial position? ------ ***// to HP***
3. So which view will show True shape? --- ***TV***
4. Which side will be vertical? --------***any side.***

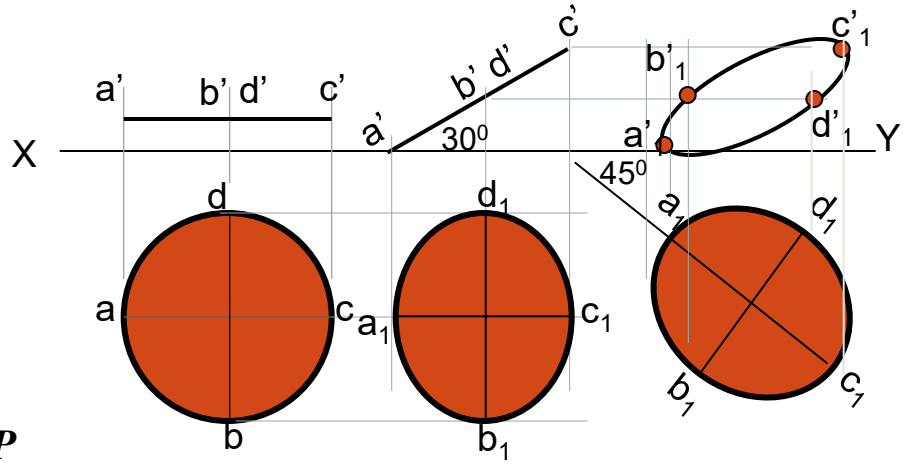
Hence begin with TV,draw pentagon below X-Y line, taking one side vertical.

SURFACE INCLINATION INDIRECTLY GIVEN
SIDE INCLINATION DIRECTLY GIVEN:

ONLY CHANGE is
the manner in which surface inclination is described:
One side on Hp & it's opposite corner 30 mm above Hp.
Hence redraw 1st Fv as a 2nd Fv making above arrangement.
Keep a'b' on xy & d' 30 mm above xy.



Problem 8: A circle of 50 mm diameter is resting on Hp on end A of it's diameter AC which is 30^0 inclined to Hp while it's Tv is 45^0 inclined to Vp.Draw it's projections.



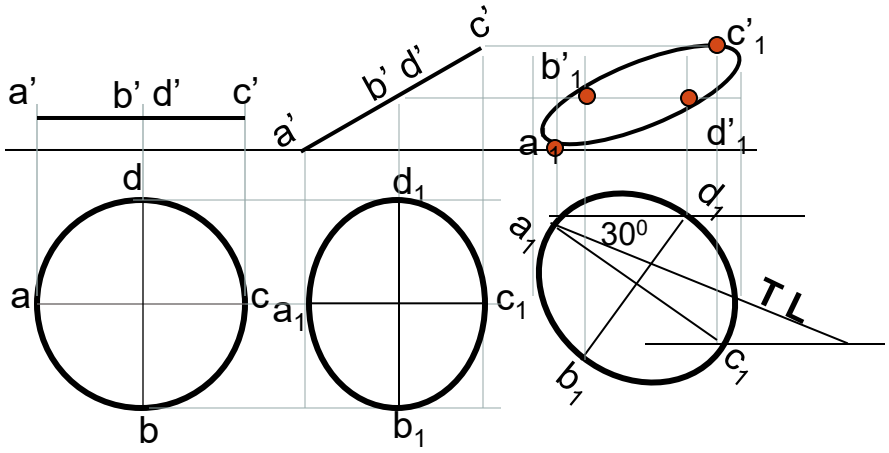
Read problem and answer following questions

1. Surface inclined to which plane? ------- ***HP***
2. Assumption for initial position? ------ ***// to HP***
3. So which view will show True shape? --- ***TV***
4. Which diameter horizontal? ---------- ***AC***

Hence begin with TV,draw rhombus below X-Y line, taking longer diagonal // to X-Y

The difference in these two problems is in step 3 only. In problem no.8 inclination of Tv of that AC is given,It could be drawn directly as shown in 3rd step. ***While in no.9 angle of AC itself i.e. it's TL, is given. Hence here angle of TL is taken,locus of c_1 Is drawn and then LTV I.e. a_1 c_1 is marked and final TV was completed.Study illustration carefully.***

Problem 9: A circle of 50 mm diameter is resting on Hp on end A of it's diameter AC which is 30^0 inclined to Hp while it makes 45^0 inclined to Vp. Draw it's projections.



Note the difference in construction of 3rd step in both solutions.

Problem 10: End A of diameter AB of a circle is in HP A nd end B is in VP.Diameter AB, 50 mm long is 30^0 & 60^0 inclined to HP & VP respectively. Draw projections of circle.

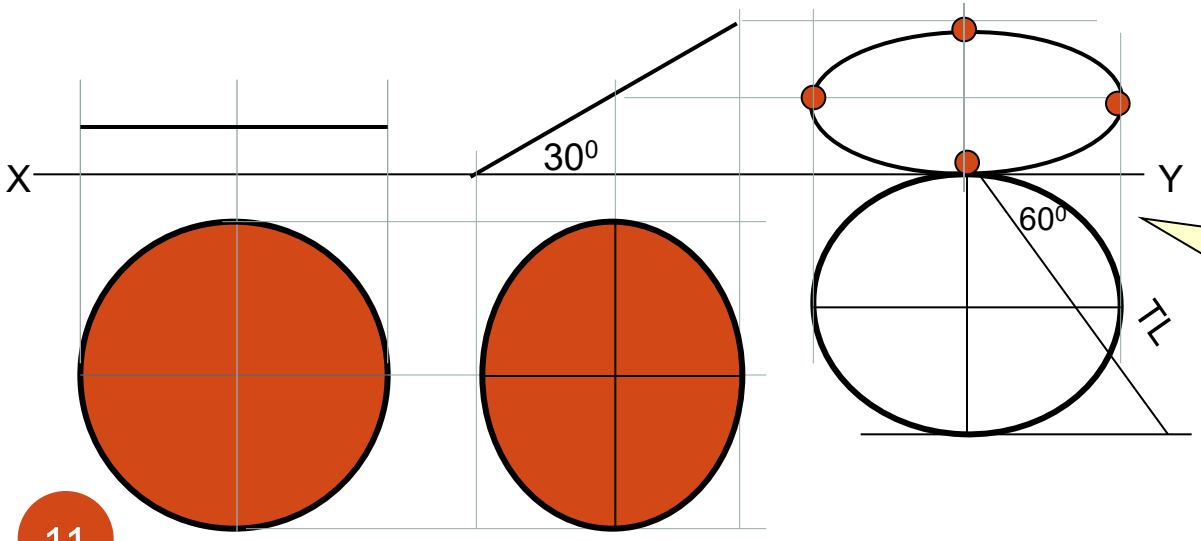
Read problem and answer following questions

1. Surface inclined to which plane? ------- ***HP***
2. Assumption for initial position? ------ ***// to HP***
3. So which view will show True shape? --- ***TV***
4. Which diameter horizontal? ---------- ***AB***

Hence begin with TV,draw CIRCLE below X-Y line, taking DIA. AB // to X-Y

The problem is similar to previous problem of circle – no.9.
But in the 3rd step there is one more change.
Like 9th problem True Length inclination of dia.AB is definitely expected but if you carefully note - the the SUM of it's inclinations with HP & VP is 90^0.
Means Line AB lies in a Profile Plane.
Hence it's both Tv & Fv must arrive on one single projector.

So do the construction accordingly AND ***note the case carefully***..



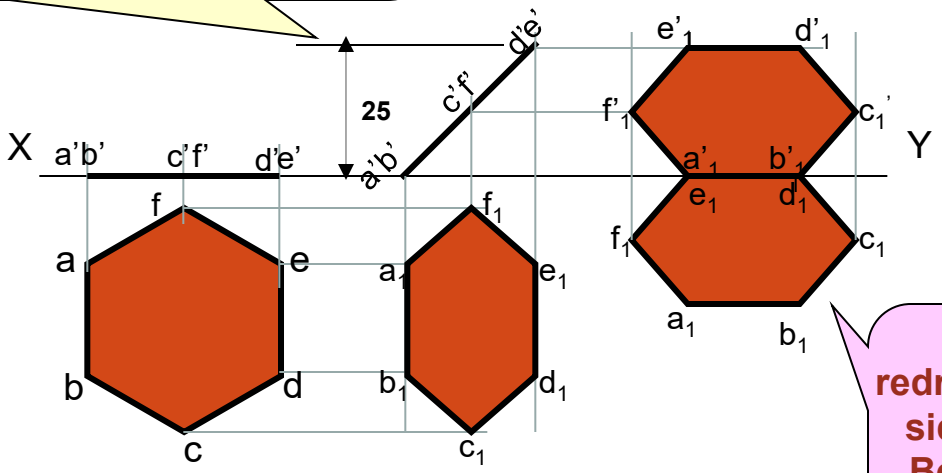
SOLVE SEPARATELY
ON DRAWING SHEET
GIVING NAMES TO VARIOUS
POINTS AS USUAL,
AS THE CASE IS IMPORTANT

Problem 11:
A hexagonal lamina has its one side in HP and
Its apposite parallel side is 25mm above Hp and
In Vp. Draw it's projections.
Take side of hexagon 30 mm long.

Read problem and answer following questions
1. Surface inclined to which plane? ------- ***HP***
2. Assumption for initial position? ------ ***// to HP***
3. So which view will show True shape? --- ***TV***
4. Which diameter horizontal? ---------- ***AC***

Hence begin with TV,draw rhombus below X-Y line, taking longer diagonal // to X-Y

ONLY CHANGE is the manner in which surface inclination is described:
One side on Hp & it's opposite side 25 mm above Hp.
Hence redraw 1st Fv as a 2nd Fv making above arrangement.
Keep a'b' on xy & d'e' 25 mm above xy.



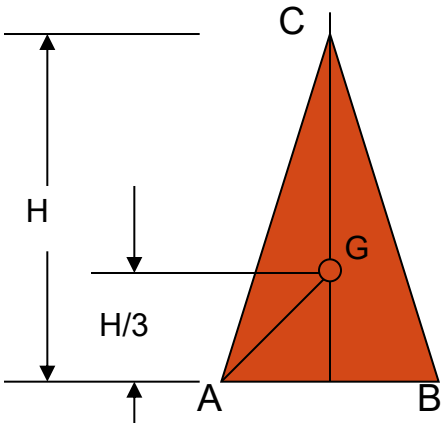
As 3rd step redraw 2nd Tv keeping side DE on xy line. Because it is in VP as said in problem.

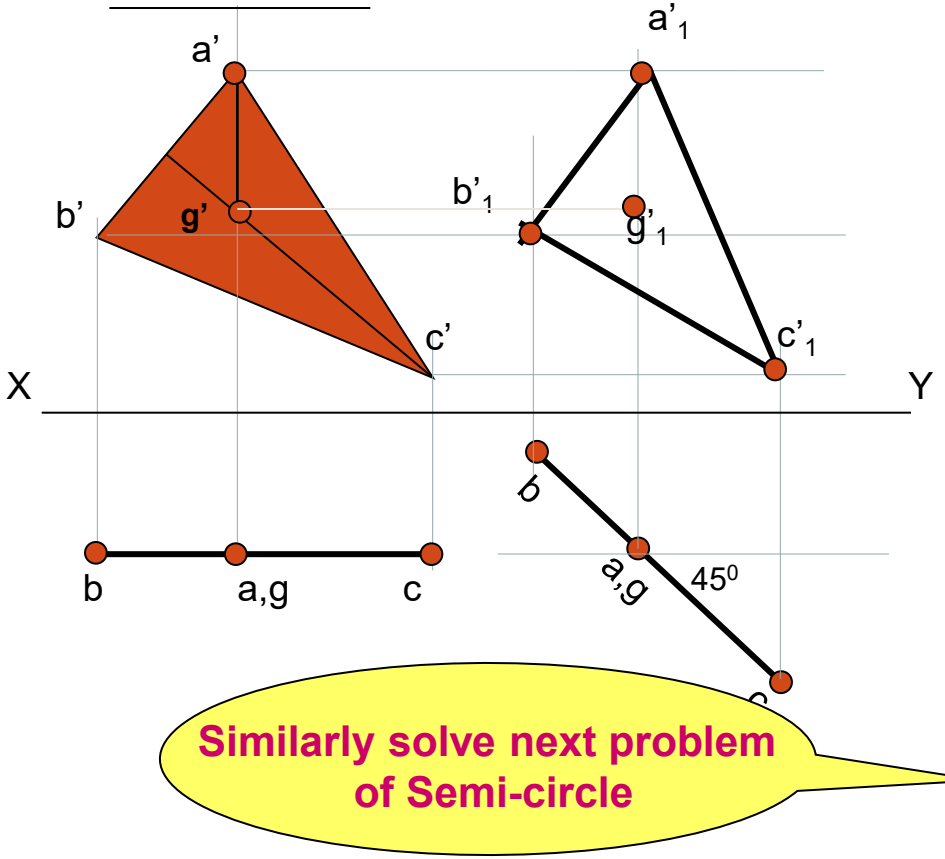
FREELY SUSPENDED CASES.

Problem 12:
An isosceles triangle of 40 mm long base side, 60 mm long altitude Is freely suspended from one corner of Base side.It's plane is 45^0 inclined to Vp. Draw it's projections.

IMPORTANT POINTS

1.In this case the plane of the figure always remains ***perpendicular to Hp***.
2.It may remain parallel or inclined to Vp.
3.Hence ***TV*** in this case will be always a ***LINE view.***
4.Assuming surface // to Vp, draw true shape in suspended position as FV.
(Here keep *line joining* ***point of contact & centroid of fig. vertical***)
5.Always begin with FV as a True Shape but in a suspended position.
AS shown in 1st FV.





First draw a given triangle With given dimensions, Locate it's centroid position And i t with point of suspension.

Similarly solve next problem of Semi-circle