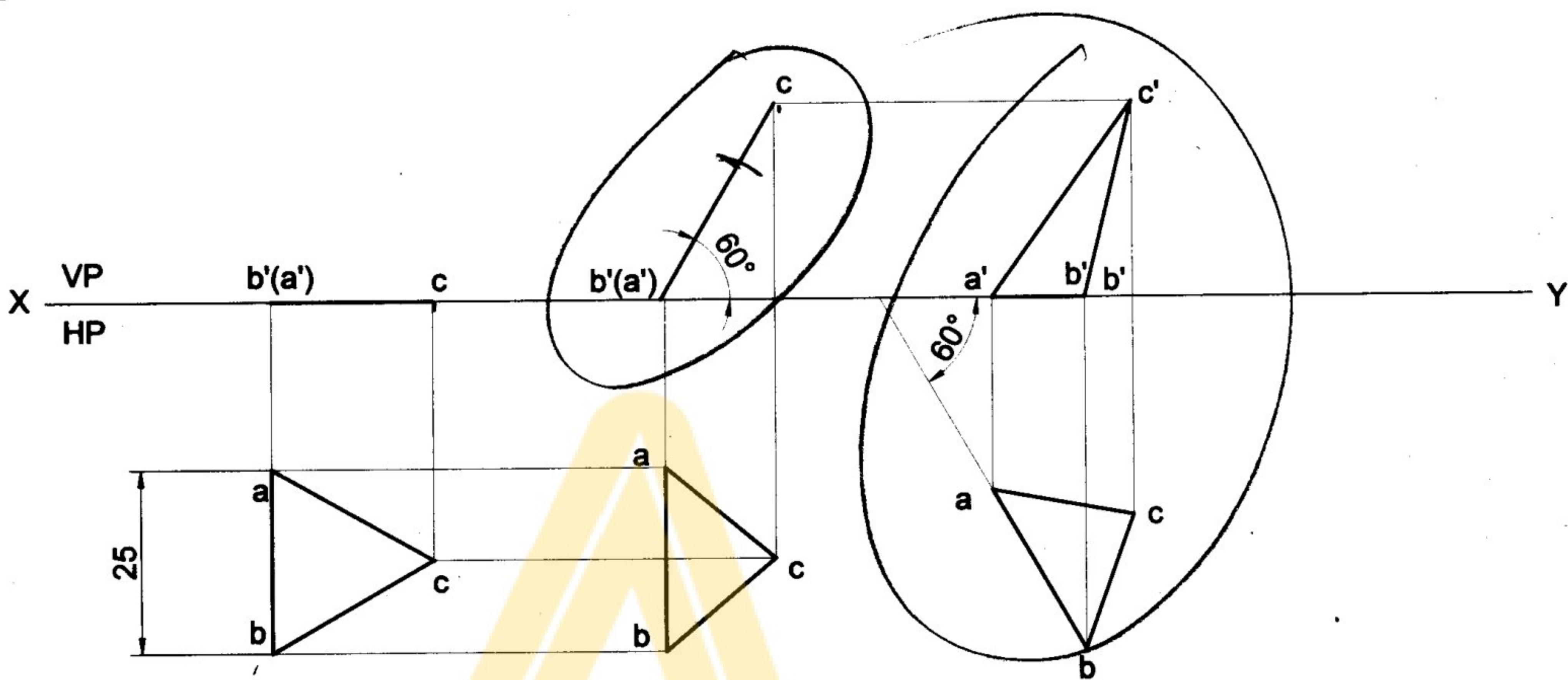


## CHAPTER 3

### PROJECTIONS OF PLANE SURFACES

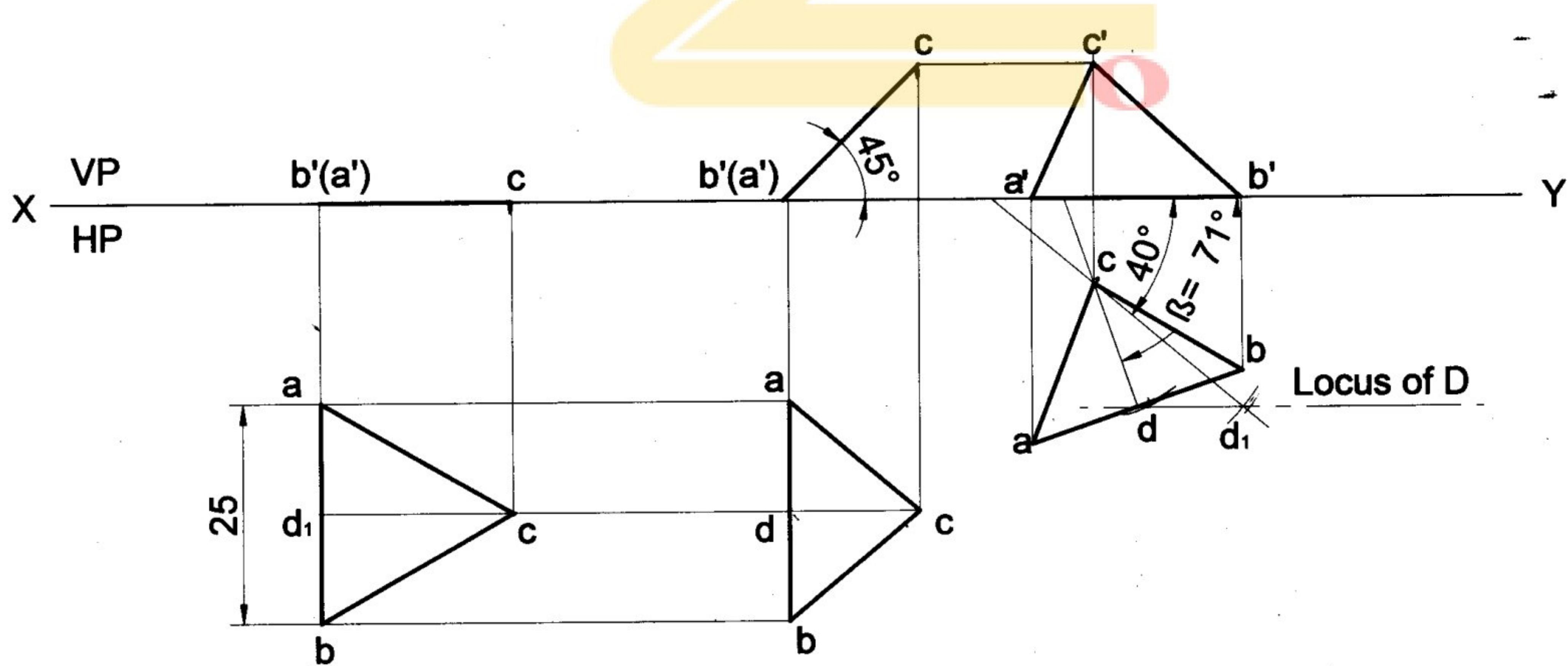
**Problem 1** An equilateral triangular lamina of 25mm side lies with one of its edges on HP such that the surface of the lamina is inclined to HP at  $60^\circ$ . The edge on which it rests is inclined to VP at  $60^\circ$ . Draw the projections.

**Solution**



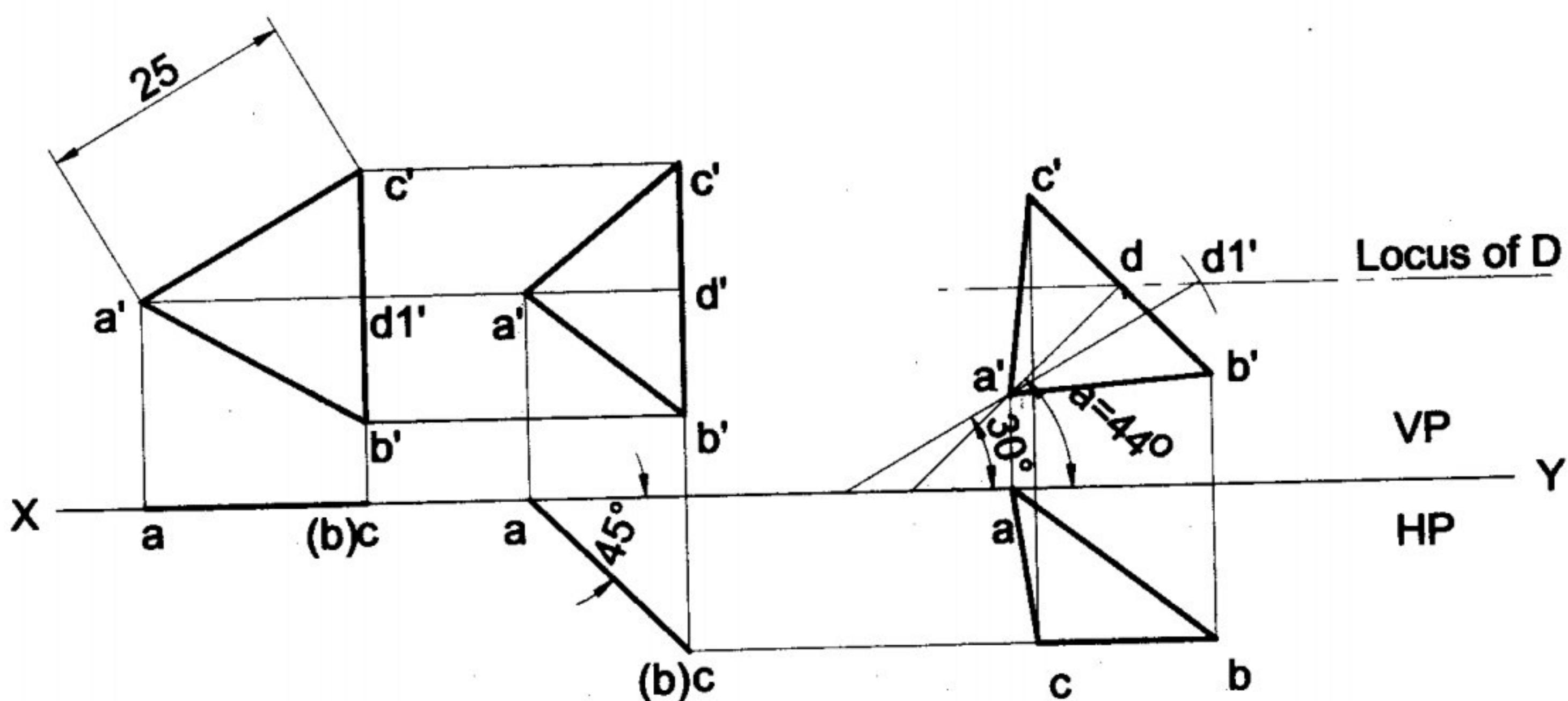
**Problem 2** An equilateral triangular lamina of 25mm side lies on one of its sides on HP. The lamina makes  $45^\circ$  with HP and one of its medians is inclined at  $40^\circ$  to VP. Draw its projections.

**Solution**



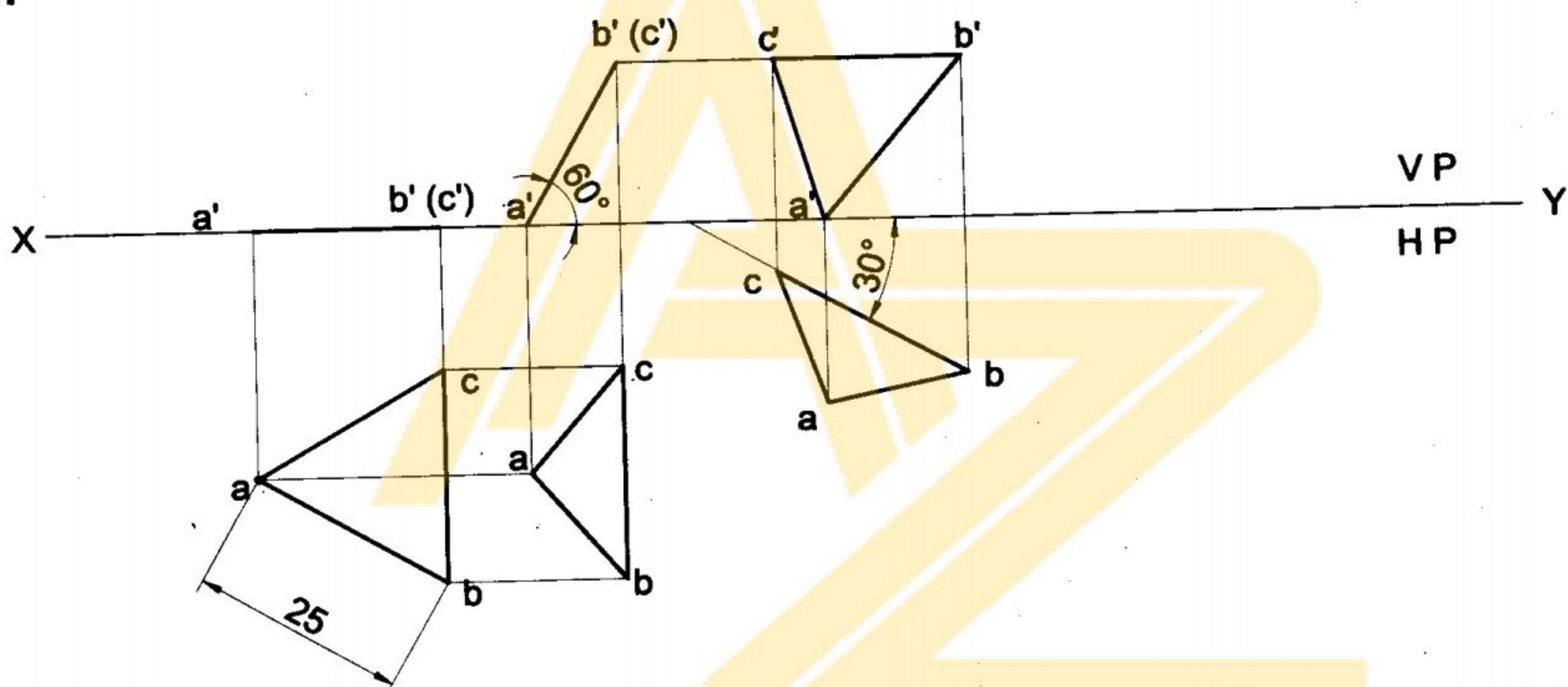
**Problem 3** A triangular lamina of 25mm sides rests on one of its corners on VP such that the median passing through the corner on which it rests is inclined at  $30^\circ$  to HP and  $45^\circ$  to VP. Draw its projections.

**Solution**



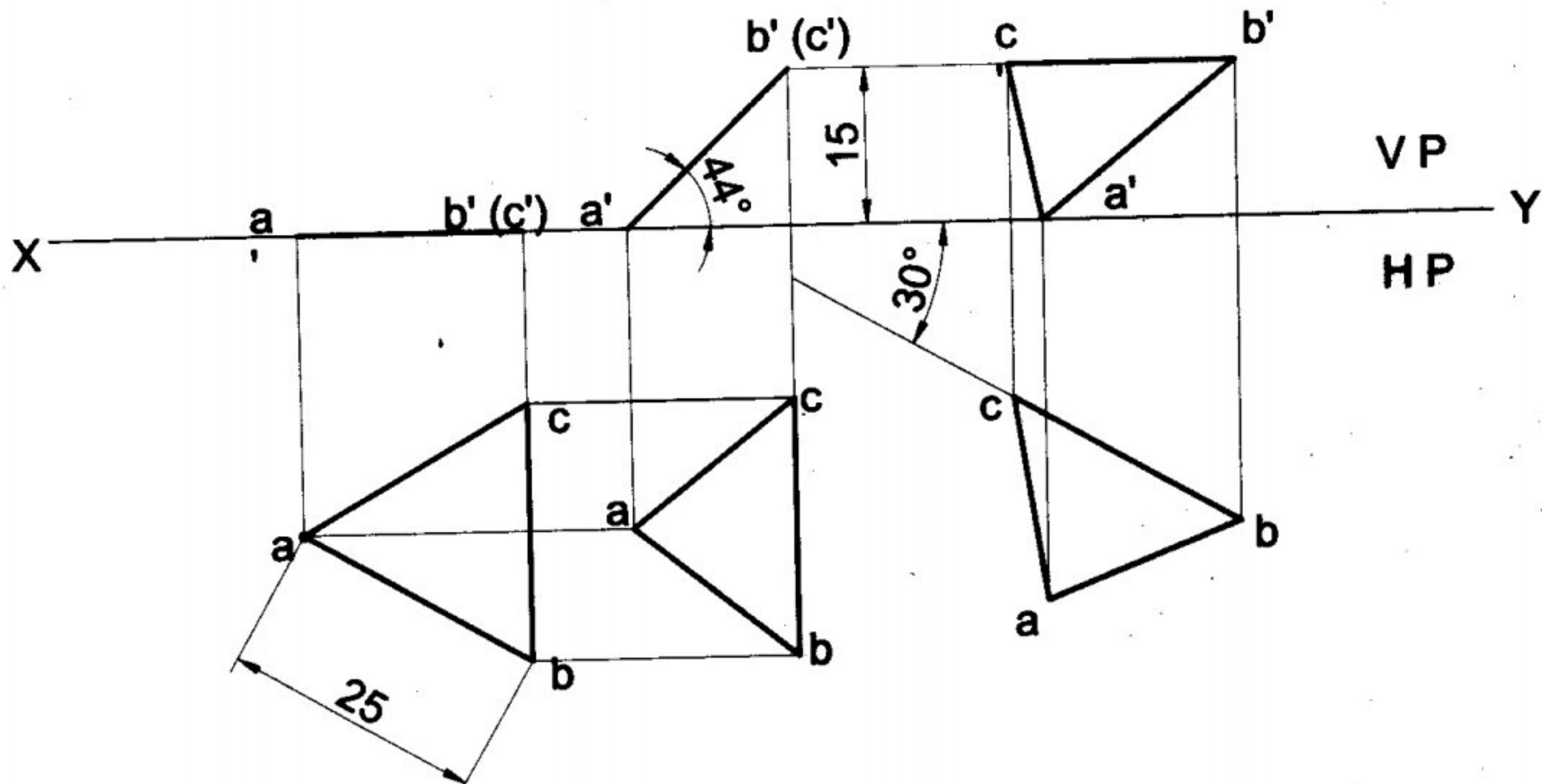
**Problem 4** A triangular plane figure of sides 25mm is resting on HP with one of its corners, such that the surface of the lamina makes an angle of  $60^\circ$  with HP. If the side opposite to the corner on which the lamina rests makes an angle of  $30^\circ$  with VP, draw the top and front views in this position.

**Solution**



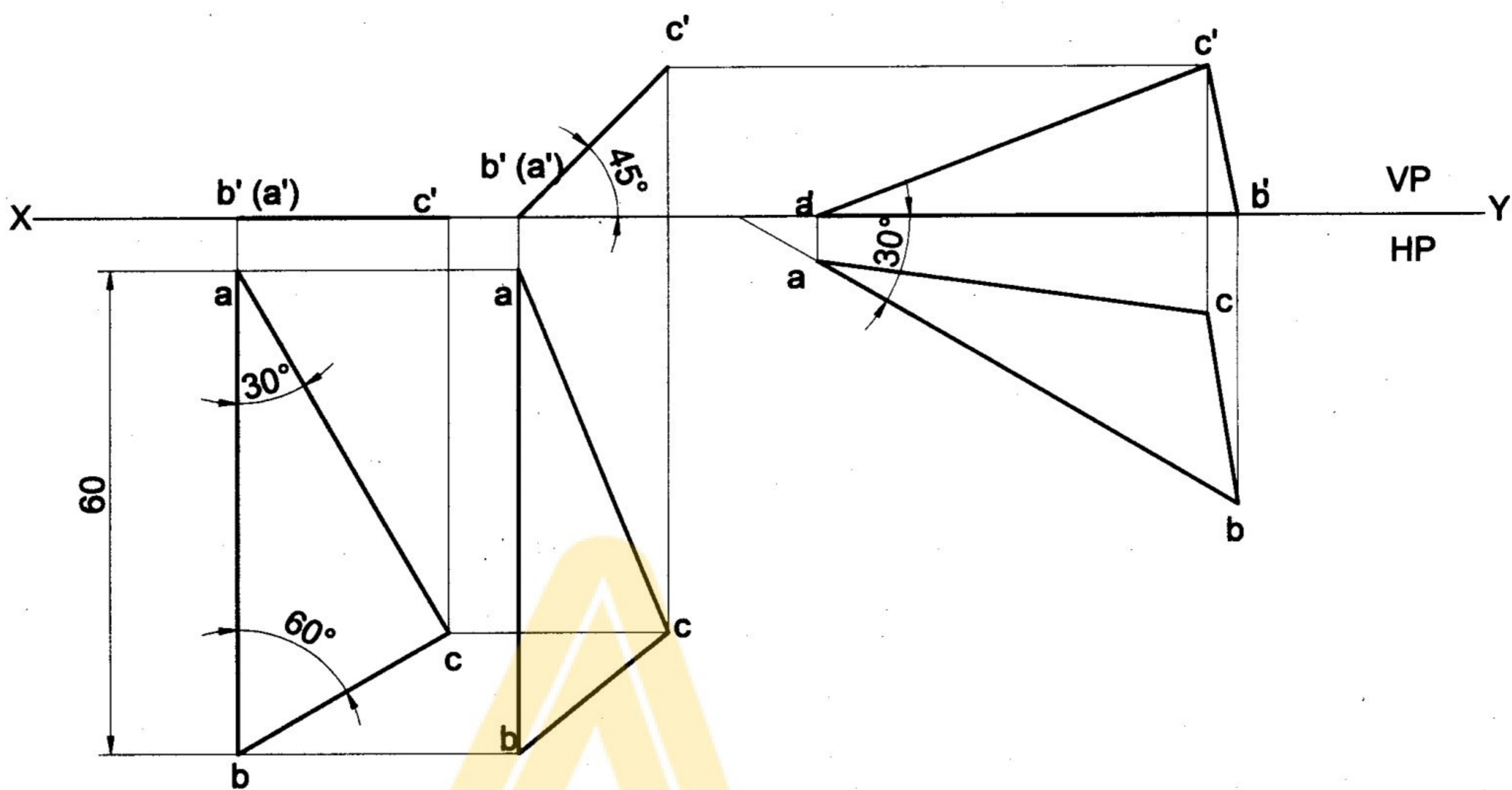
**Problem 5** A triangular plane lamina of sides 25mm is resting on HP with one of its corners touching it, such that the side opposite to the corner on which it rests is 15mm above HP and makes an angle of  $30^\circ$  with VP. Draw the top and front views in this position. Also determine the inclination of the lamina to the reference plane.

**Solution**



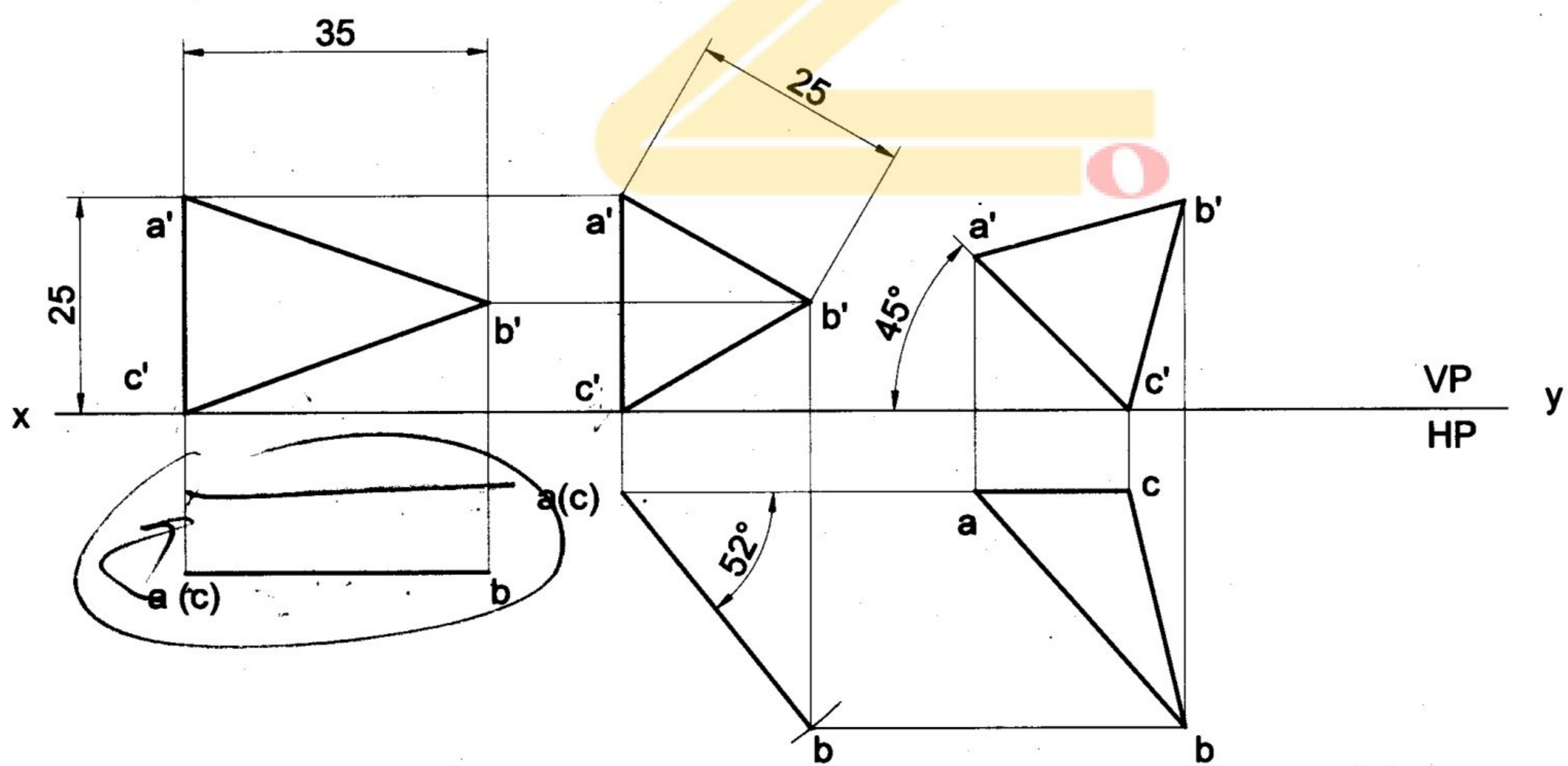
**Problem 6** A  $30^\circ$ - $60^\circ$  setsquare of 60mm longest side is so kept such that the longest side is in HP, making an angle of  $30^\circ$  with VP. The set square itself is inclined at  $45^\circ$  to HP. Draw the projections of the setsquare.

**Solution**



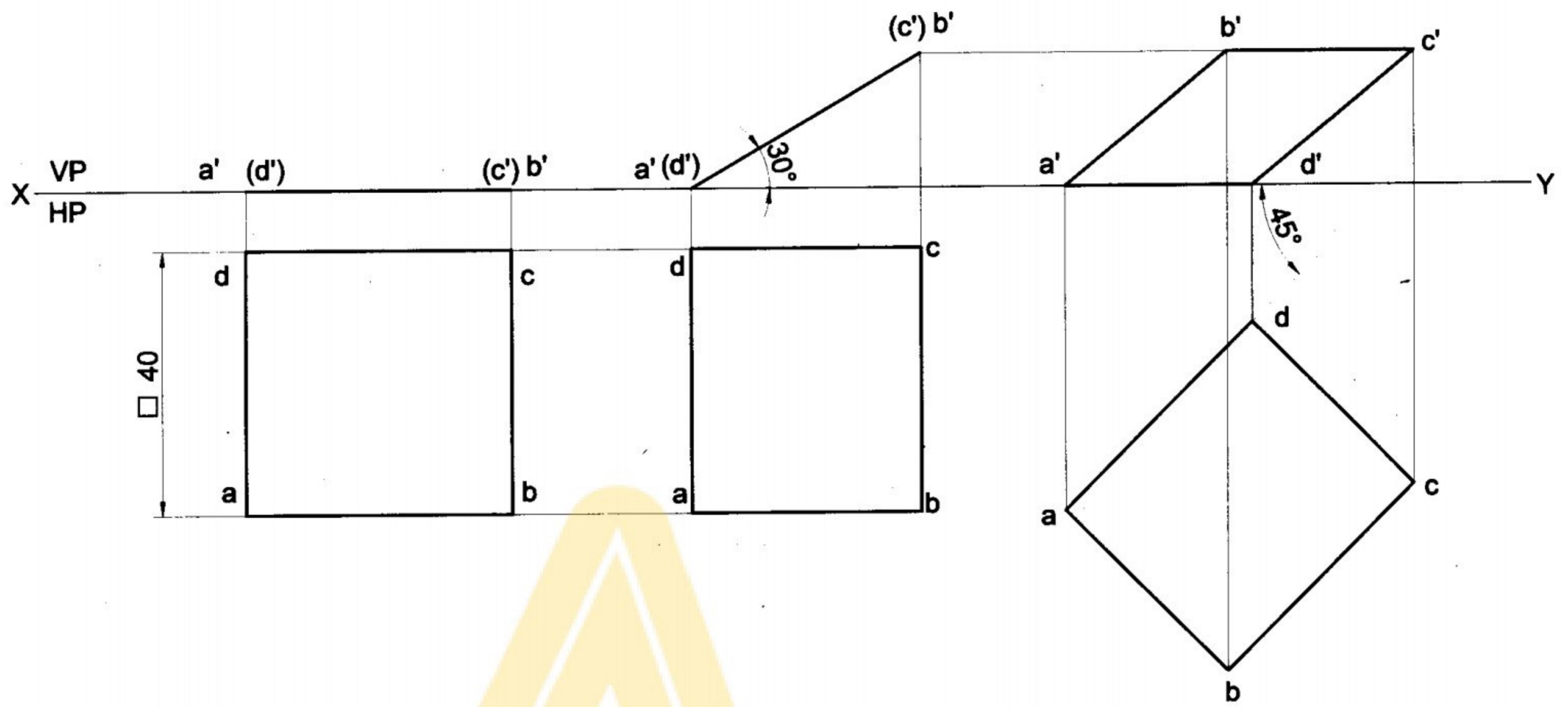
**Problem 7** An isosceles triangular plate of negligible thickness has base 25mm long and altitude 35mm. It is so placed on HP such that in the front view it is seen as an equilateral triangle of 25mm sides with the side that is parallel to VP is inclined at  $45^\circ$  to HP. Draw its top and front views. Also determine the inclination of the plate with the reference plane.

**Solution**



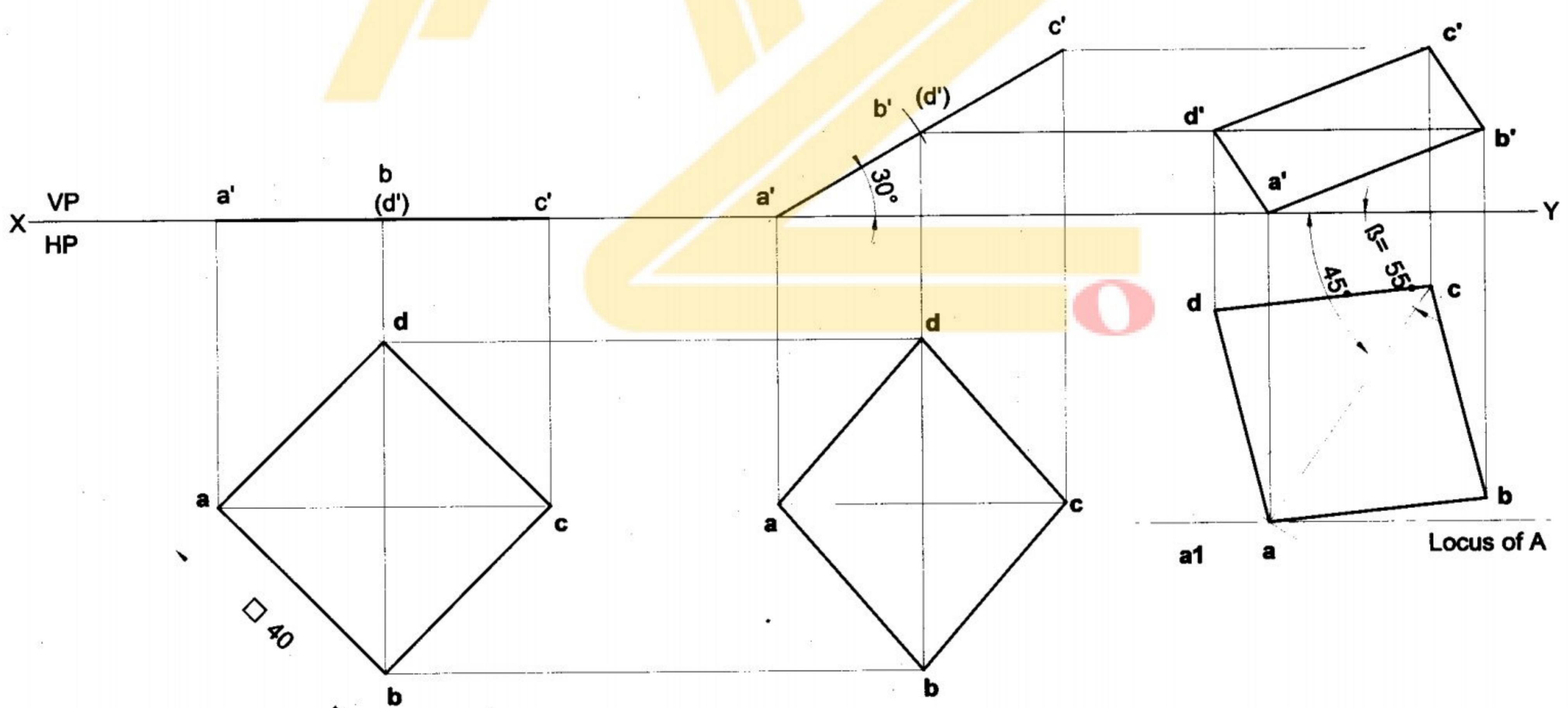
**Problem 8** A square lamina of 40mm side rests on one of its sides on HP. The lamina makes  $30^\circ$  to HP and the side on which it rests makes  $45^\circ$  to VP. Draw its projections.

**Solution**



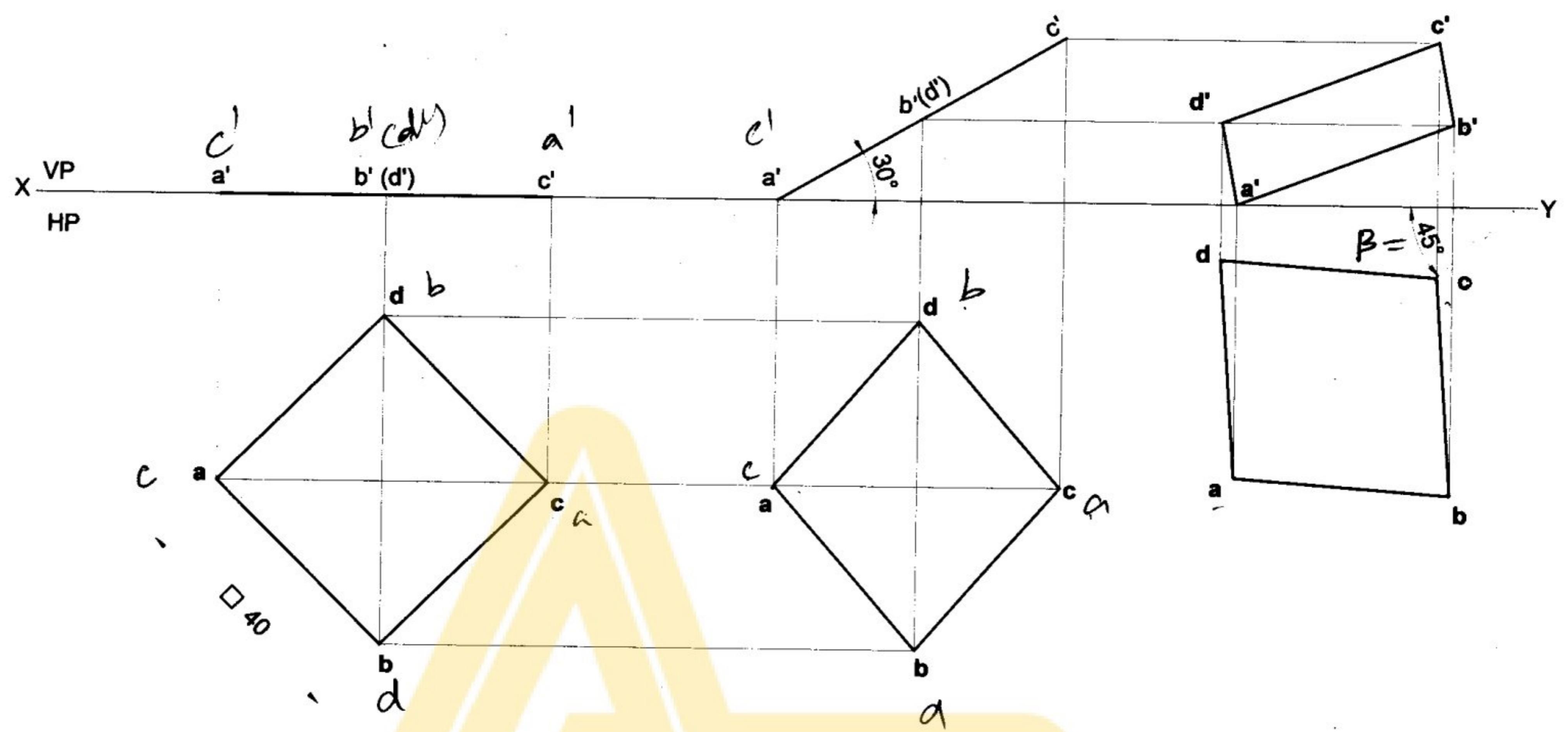
**Problem 9** A square plate of 30mm sides rests on HP such that one of the diagonals is inclined at  $30^\circ$  to HP and  $45^\circ$  to VP. Draw its projections.

**Solution**



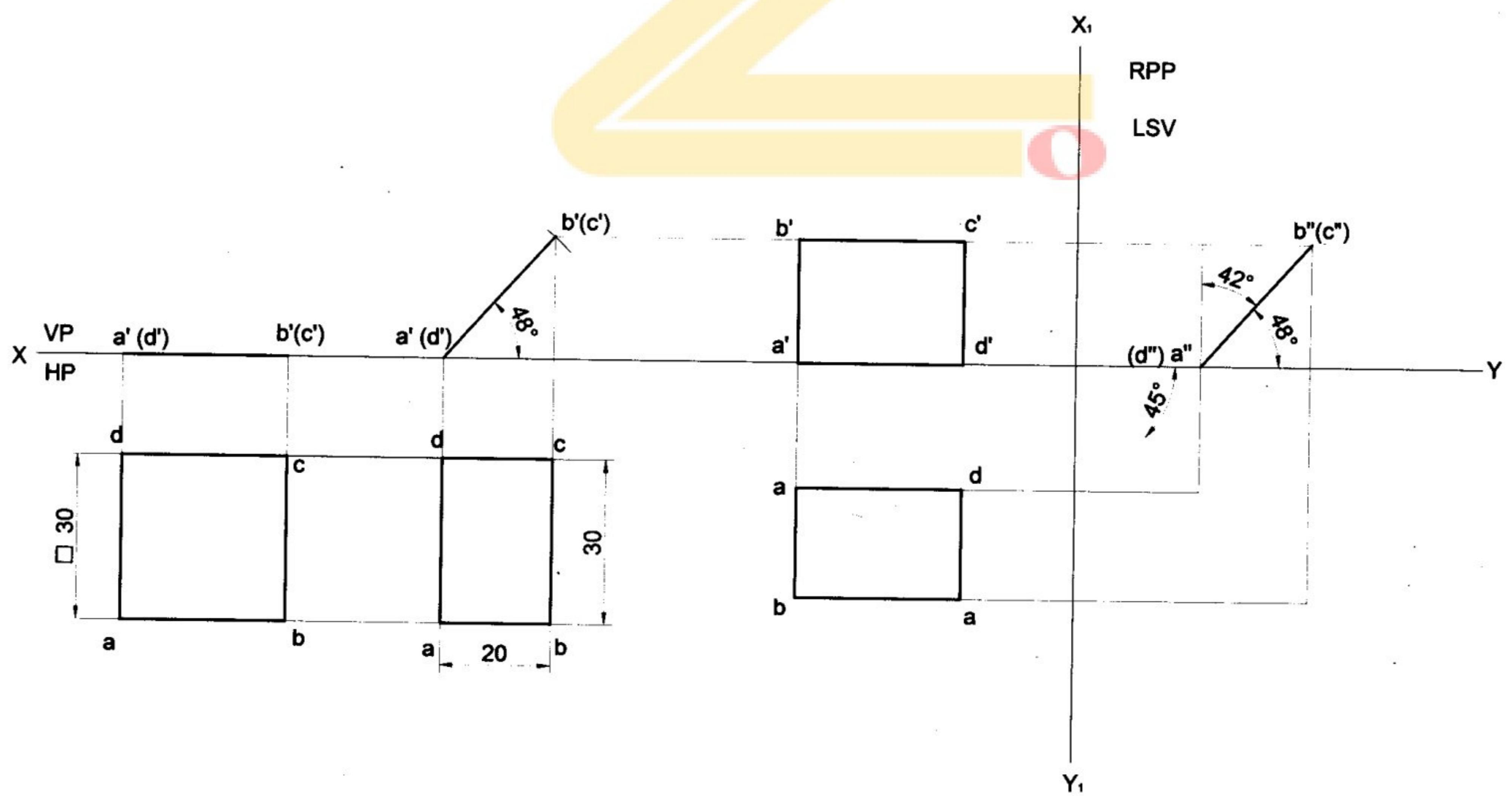
**Problem 10** A square lamia ABCD of 40mm side rests on corner C such that the diagonal AC appears to be at  $45^\circ$  to VP. The two sides BC and CD containing the corner C make equal inclinations with HP. The surface of the lamina makes  $30^\circ$  with HP. Draw its top and front views.

**Solution**



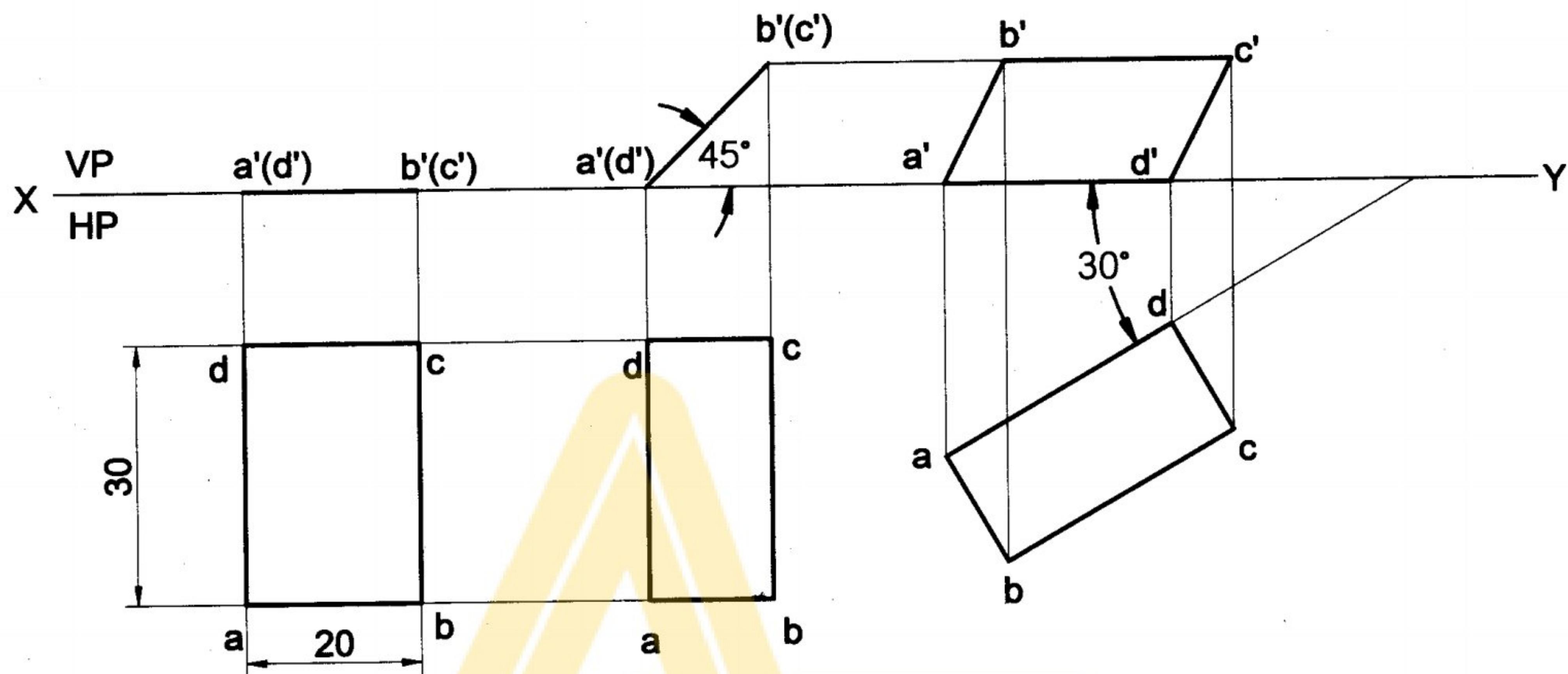
**Problem 11** The top view of a square lamia of side 30mm is a rectangle of sides 30mm x 20mm with the longer side of the rectangle being parallel to both HP and VP. Draw the top and front views of the square lamina. What is the inclination of the surface of the lamina with HP and VP?

**Solution**



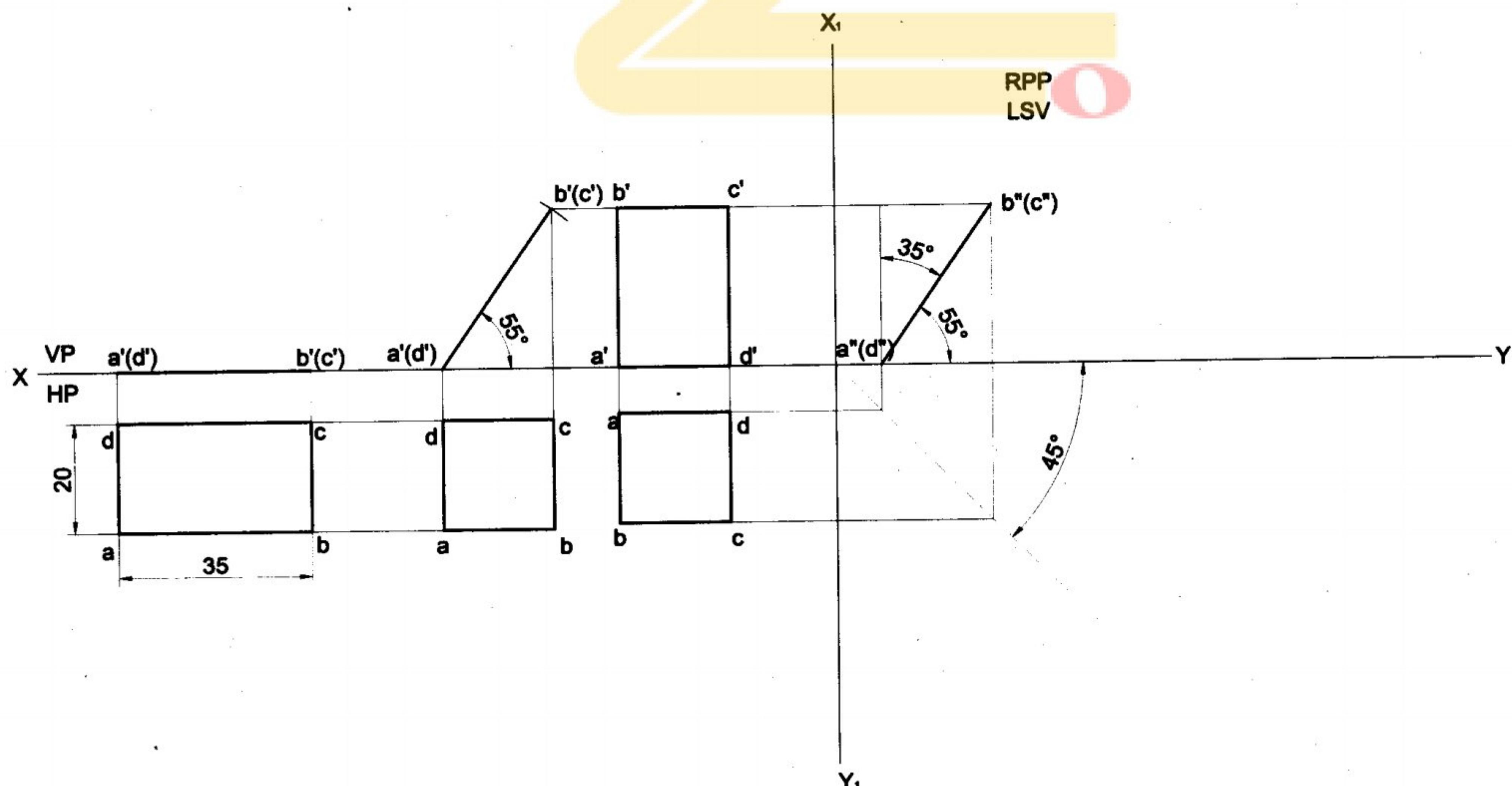
**Problem 12** A rectangular lamina of sides 20mm x 30mm rests on HP on one of its longer edges. The lamina is tilted about the edge on which it rests till its plane surface is inclined to HP at  $45^\circ$ . The edge on which it rests is inclined at  $30^\circ$  to VP. Draw the projections of the lamina.

**Solution**



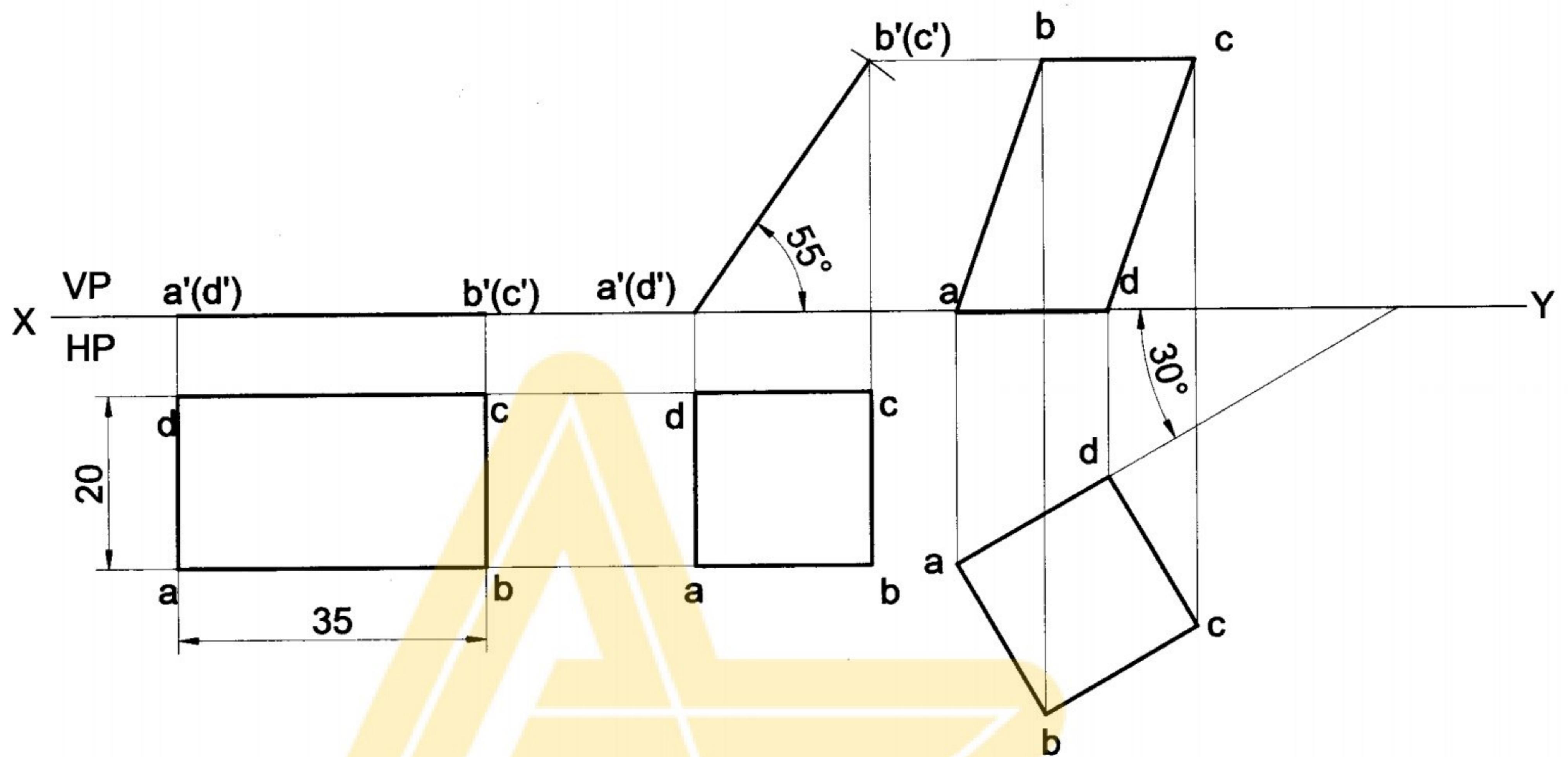
**Problem 13** A rectangular lamina of 35mm x 20mm rests on HP on one of its shorter edges. The lamina is rotated about the edge on which it rests till it appears as a square in the top view. The edge on which the lamina rests being parallel to both HP and VP. Draw its projections and find its inclinations to HP and VP.

**Solution**



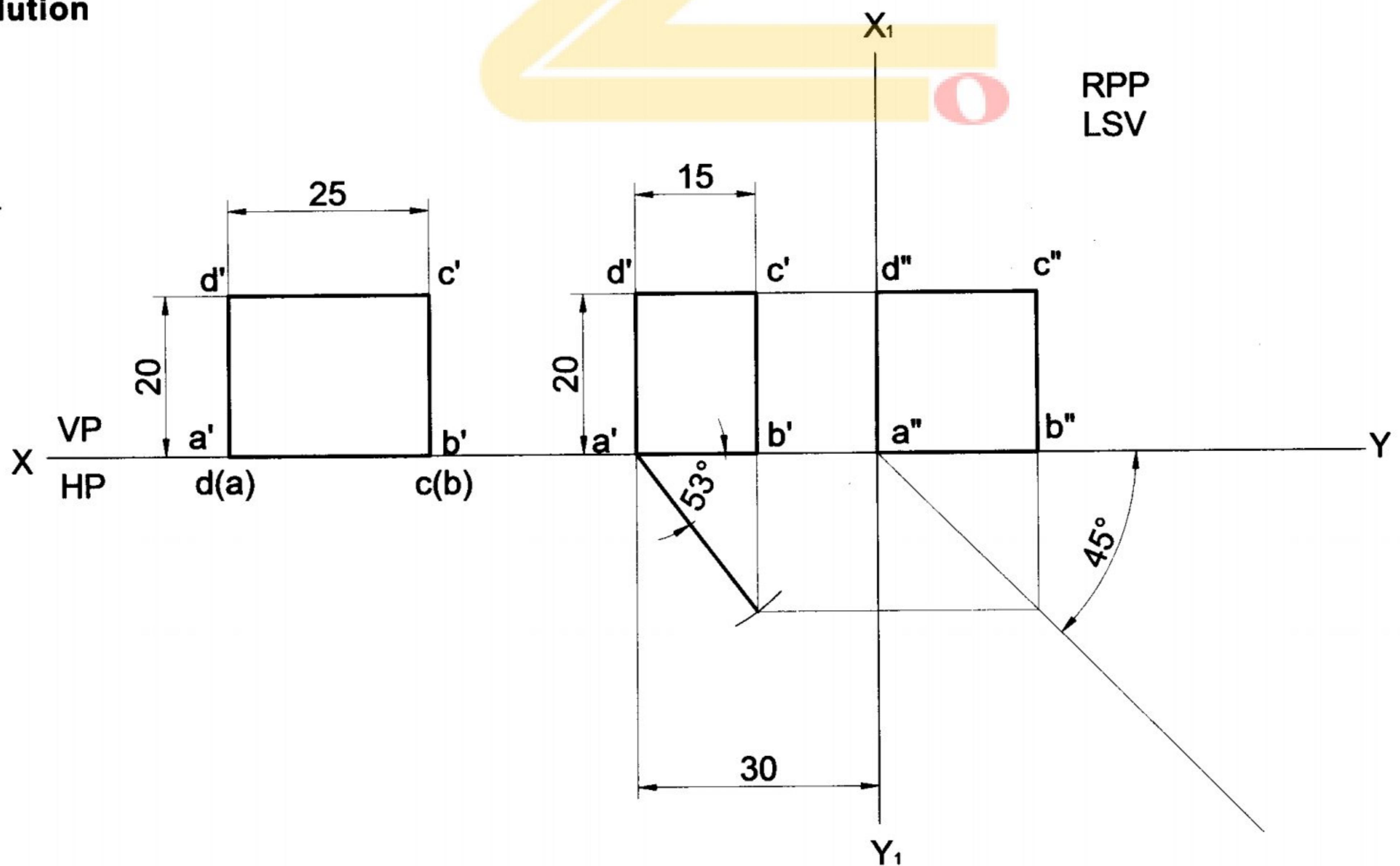
**Problem 14** A rectangular lamina of 35mm x 20mm rests on HP on one of its shorter edges. The lamina is rotated about the edge on which it rests till it appears as a square in the top view. The edge on which the lamina rests is inclined 30° to VP. Draw its projections and find its inclination to HP.

**Solution**



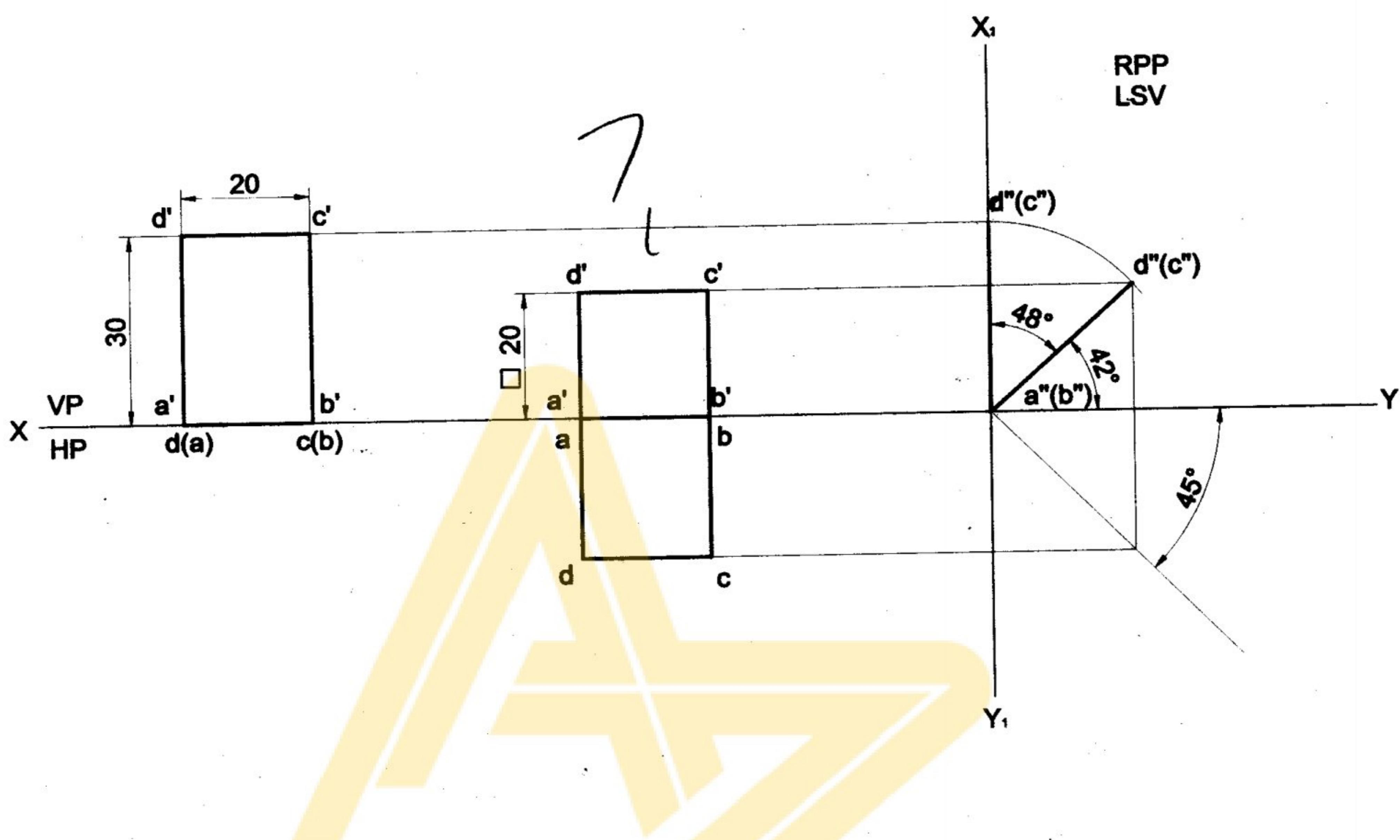
**Problem 15** A rectangular lamina of sides 20mm x 25mm has an edge in HP and adjoining edge in VP, is tilted such that the front view appears as a rectangle of 20mm x 15mm. The edge, which is in VP, is 30mm from the right profile plane. (a) Draw the top view, front view and the left profile view in this position. (b) Find its inclinations with the corresponding principal planes.

**Solution**



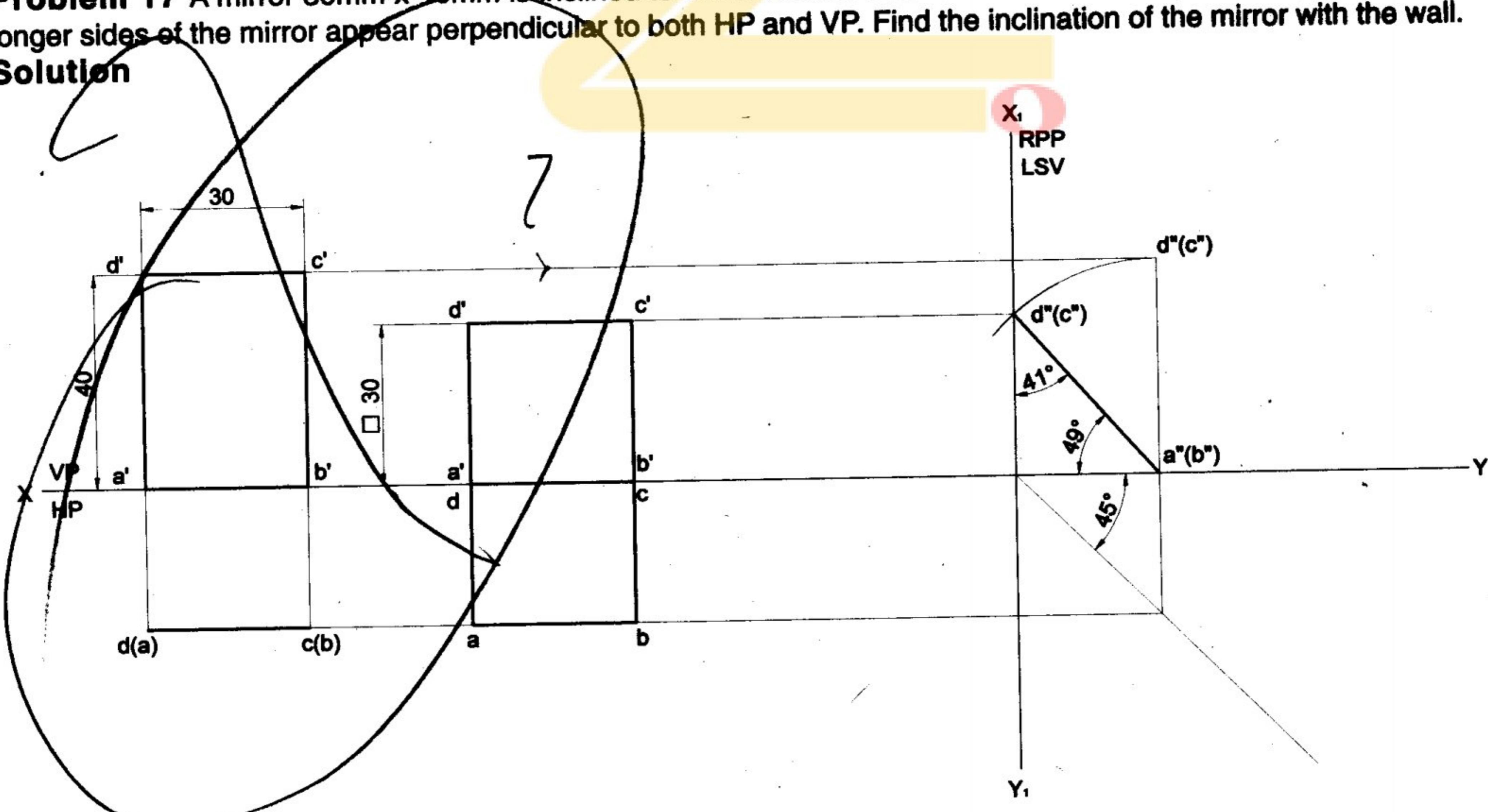
**Problem 16** The front view of a rectangular lamina of sides 30mm x 20mm is square of 20mm sides. Draw the projections and determine the inclinations of the surface of the lamina with HP and VP.

**Solution**



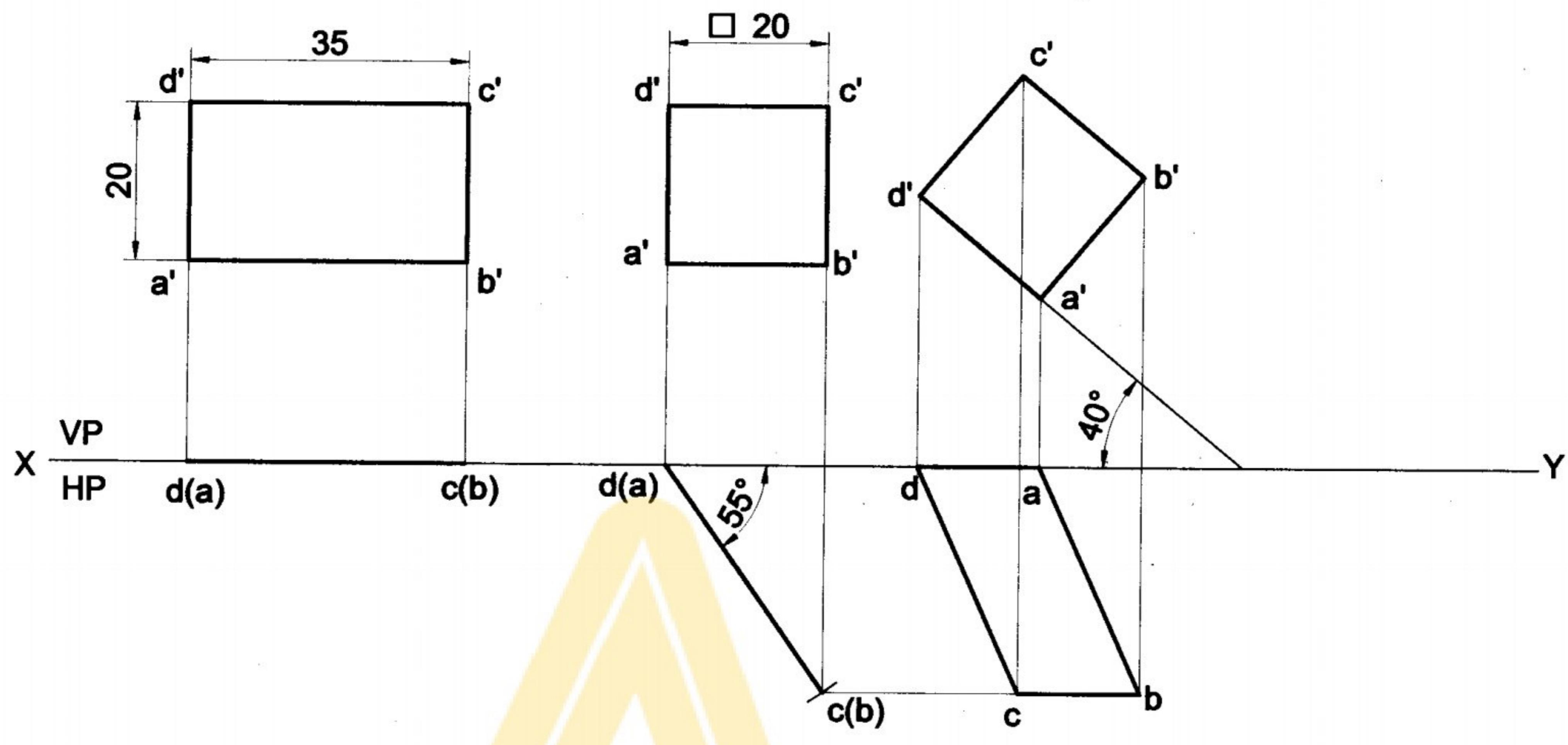
**Problem 17** A mirror 30mm x 40mm is inclined to the wall such that its front view is a square of 30mm side. The longer sides of the mirror appear perpendicular to both HP and VP. Find the inclination of the mirror with the wall.

**Solution**



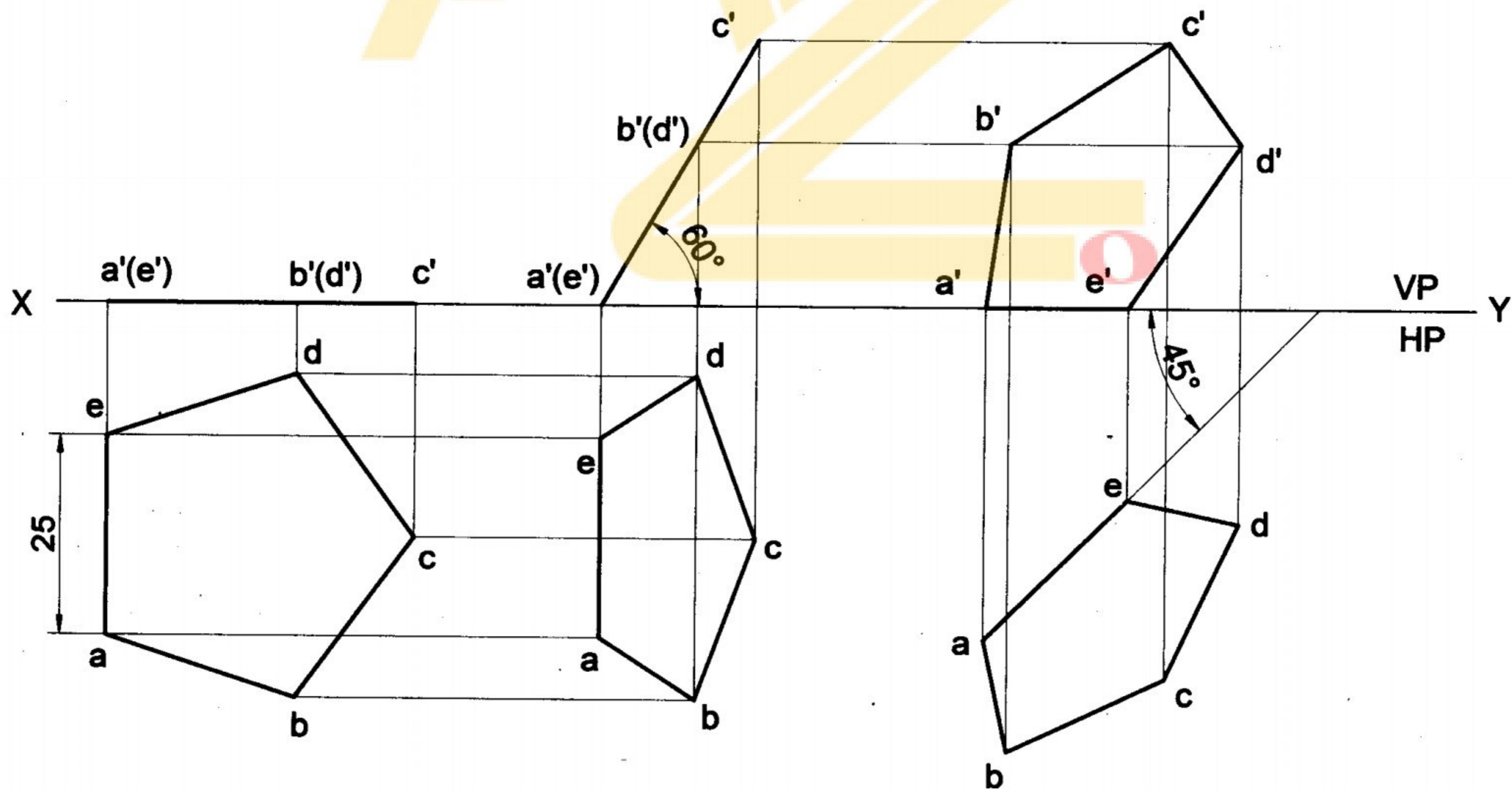
**Problem 18** A rectangular plate of negligible thickness of size 35x20mm has one of its shorter edges in VP with that edge inclined at  $40^\circ$  to HP. Draw the top view if its front view is a square of side 20mm.

**Solution**



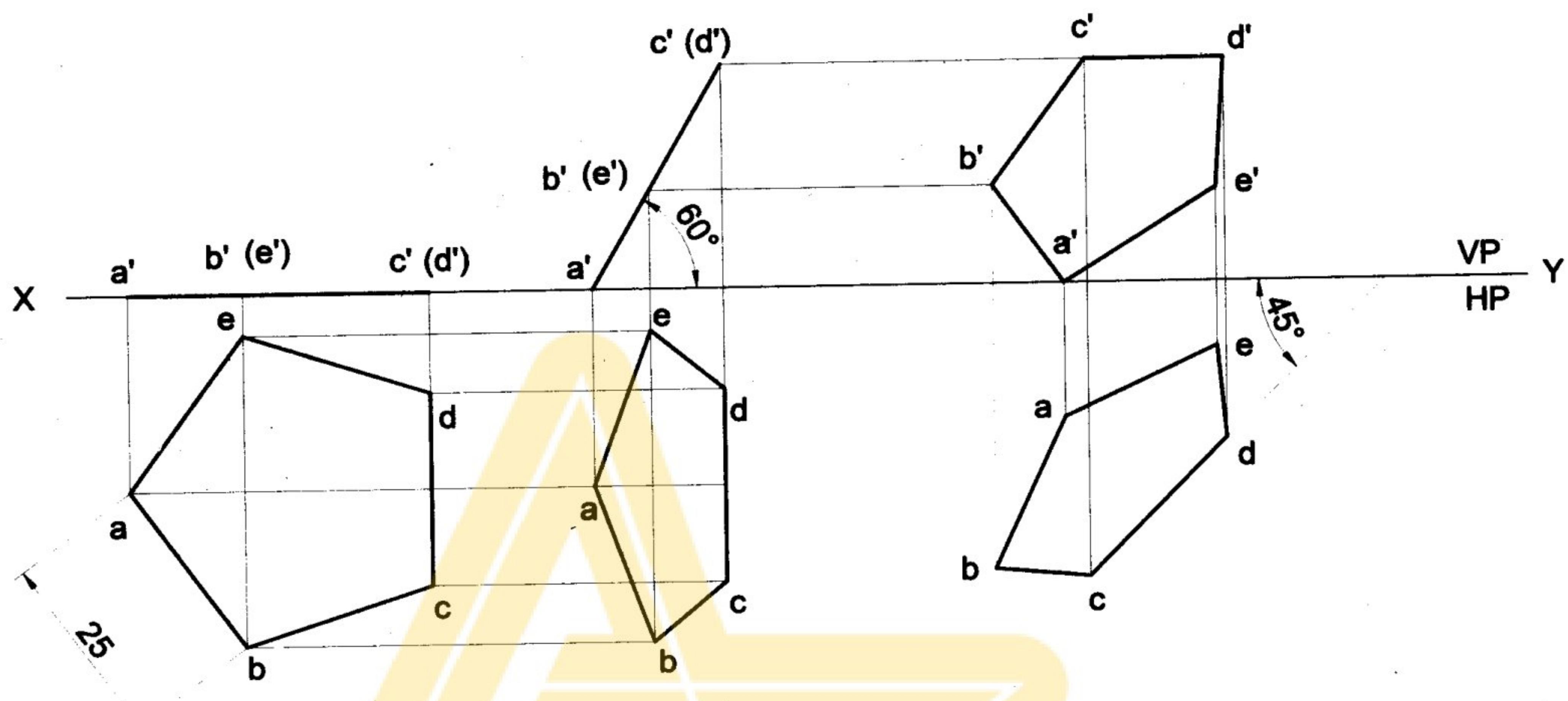
**Problem 19** A pentagonal lamina of edges 25mm is resting on HP with one of its sides such that the surface makes an angle of  $60^\circ$  with HP. The edge on which it rests is inclined at  $45^\circ$  to VP. Draw its projections.

**Solution**



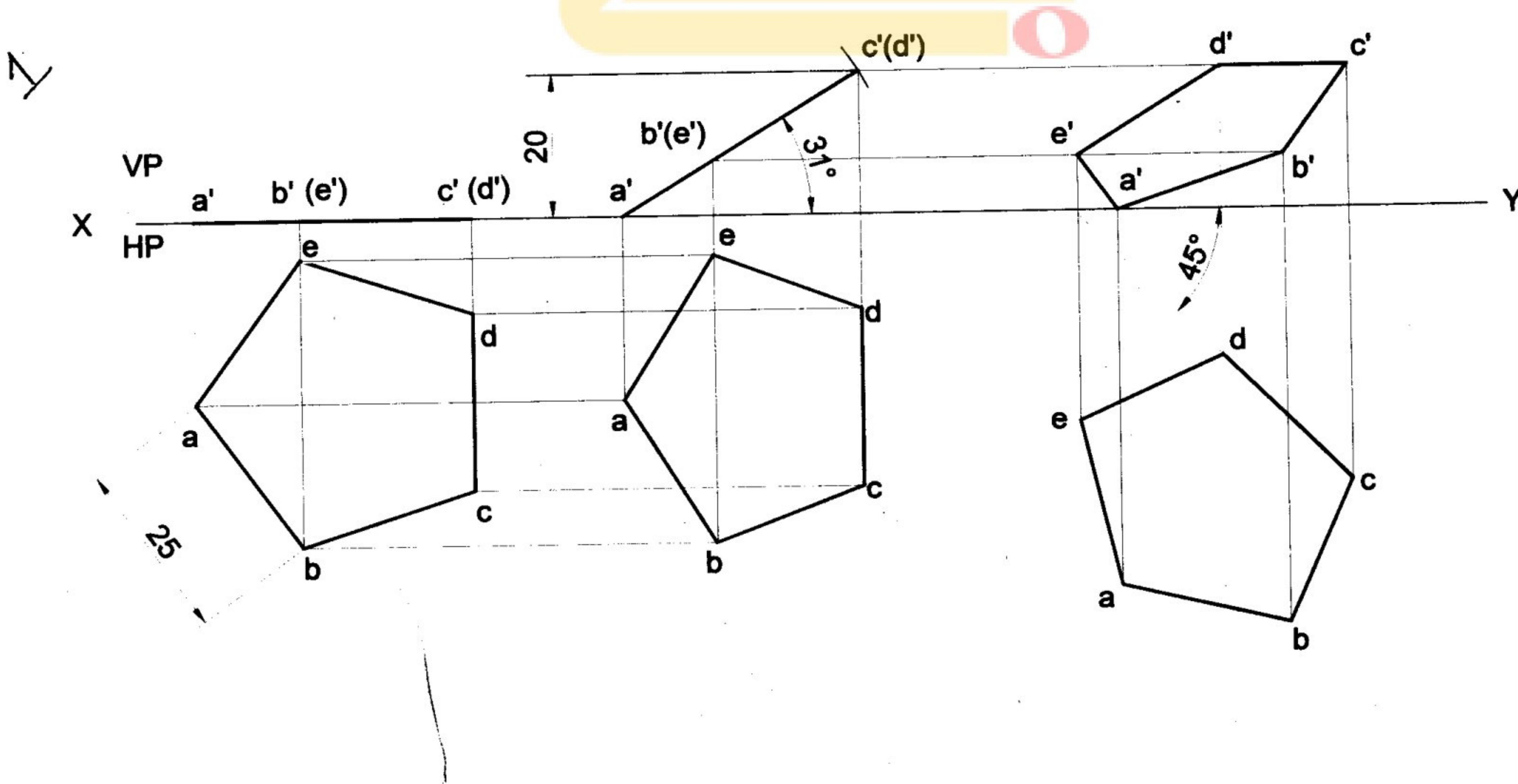
**Problem 20** A pentagonal lamina of edges 25mm is resting on HP with one of its corners such that the plane surface makes an angle of  $60^\circ$  with HP. The two edges containing the corner on which the lamina rests make equal inclinations with HP. When the edge opposite to this corner make an angle of  $45^\circ$  with VP and nearer to the observer, draw the top and front views of the plane lamina in this position.

**Solution**



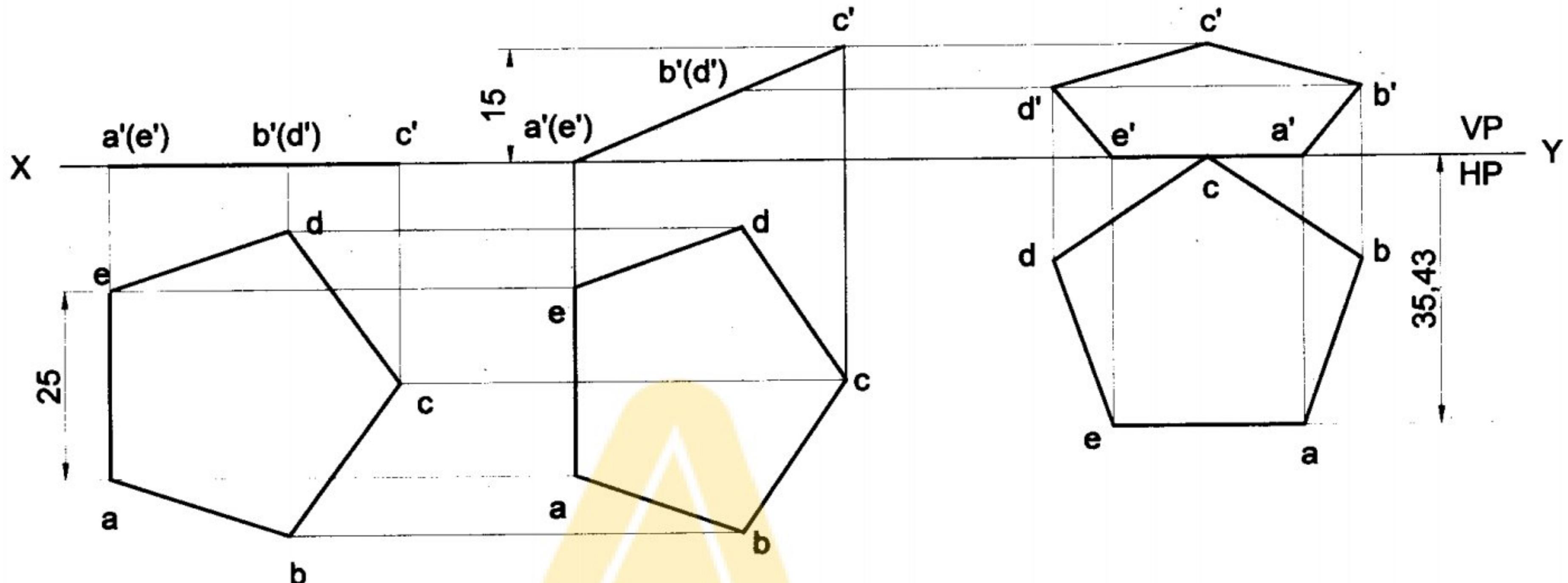
**Problem 21** A pentagonal lamina of edges 25mm is resting on HP with one of its corners such that the edge opposite to this corner is 20mm above HP & makes an angle of  $45^\circ$  with VP. Draw the top and front views of the plane lamina in this position. Determine the inclination of the lamina with HP.

**Solution**



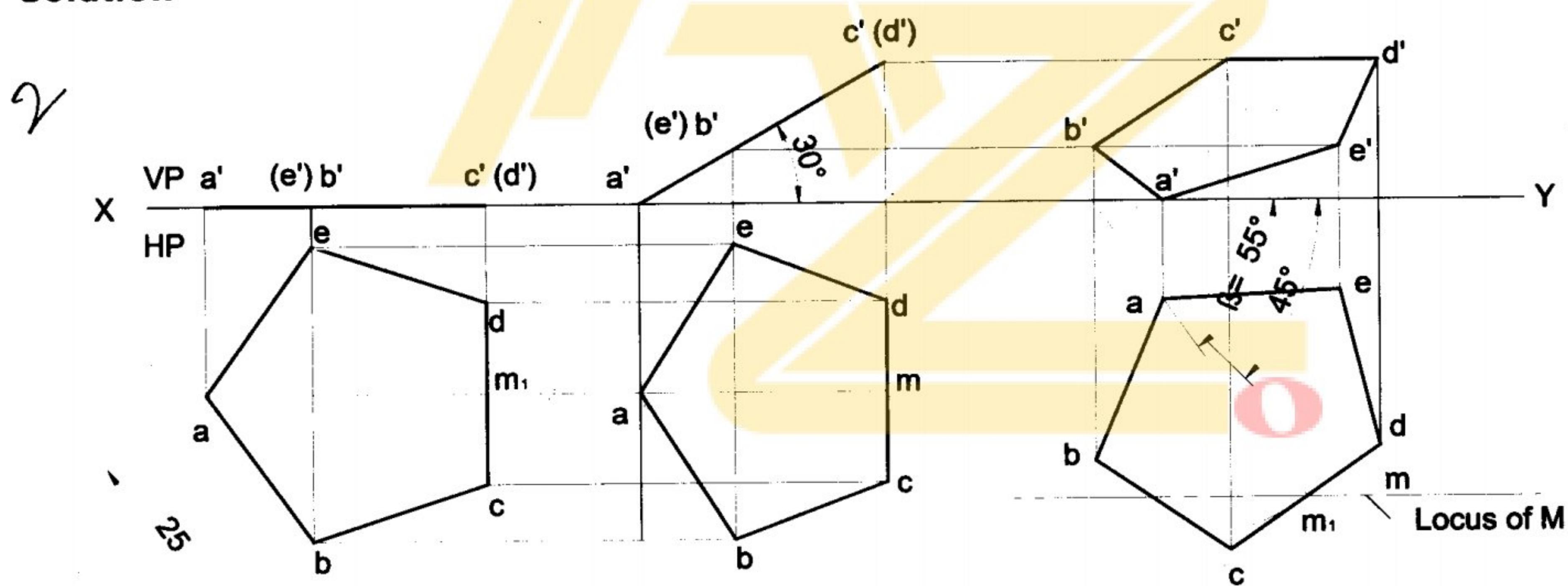
**Problem 22** A pentagonal lamina of sides 25mm is resting on one of its edges on HP with the corner opposite to that edge touching VP. This edge is parallel to VP and the corner, which touches VP, is at a height of 15mm above HP. Draw the projections of the lamina and determine the inclinations of the lamina with HP and VP and the distance at which the parallel edge lies from VP.

**Solution**



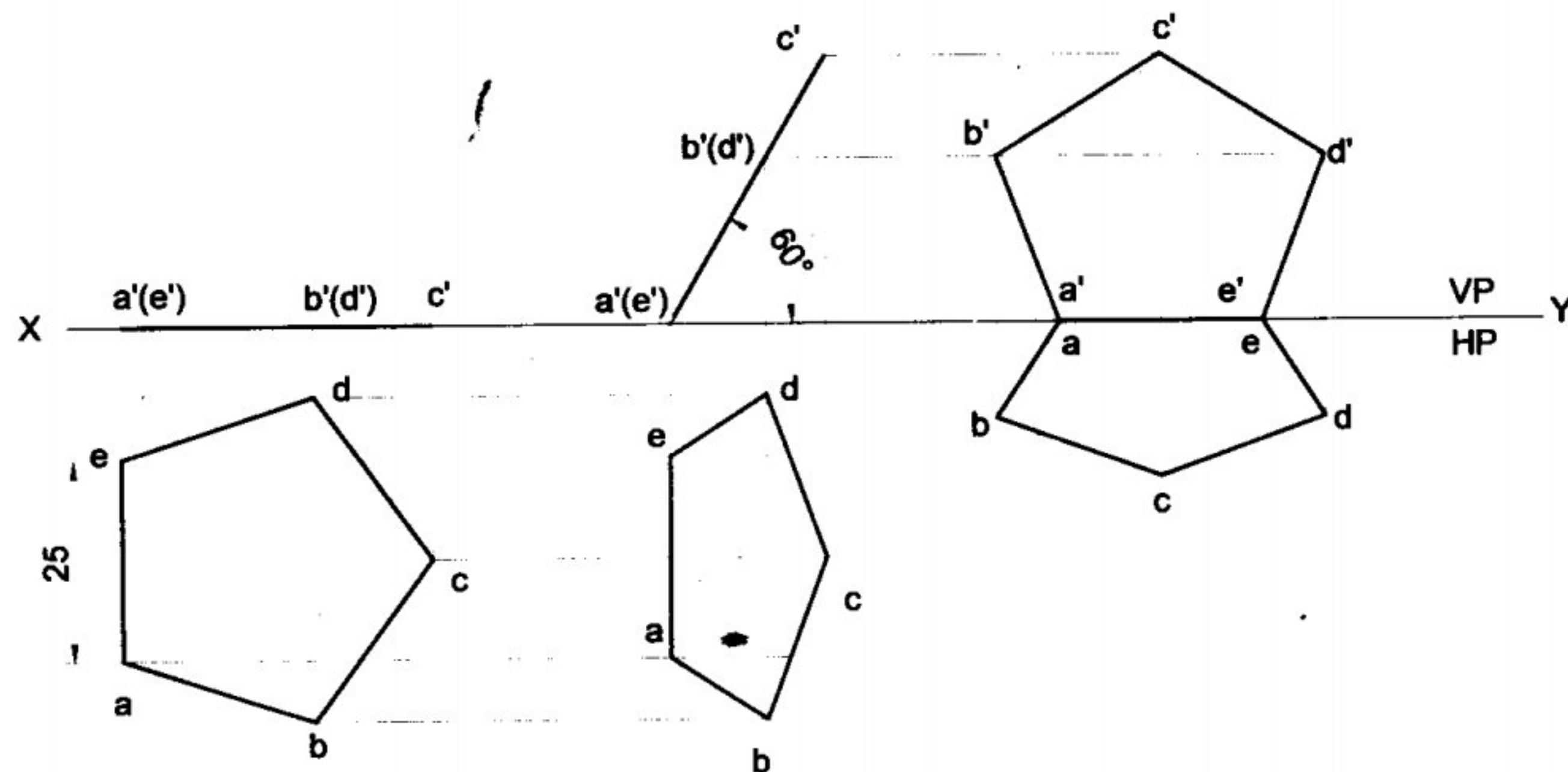
**Problem 23** A pentagonal lamina having edges 25mm is placed on one of its corners on HP such that the perpendicular bisector of the edge passing through the corner on which the lamina rests is inclined at  $30^\circ$  to HP and  $45^\circ$  to VP. Draw the top and front views of the lamina.

**Solution**



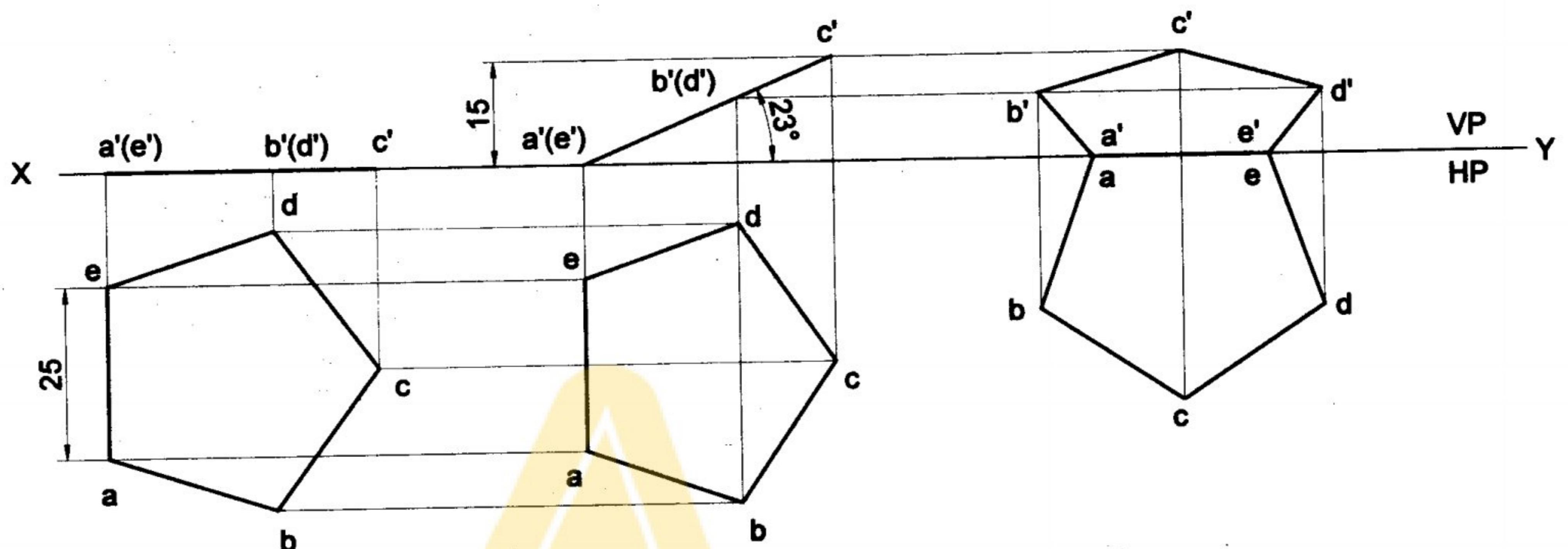
**Problem 24** A pentagonal lamina of sides 25mm is having a side both on HP and VP. The corner opposite to the side on which it rests is 15mm above HP. Draw the top and front views of the lamina.

**Solution**



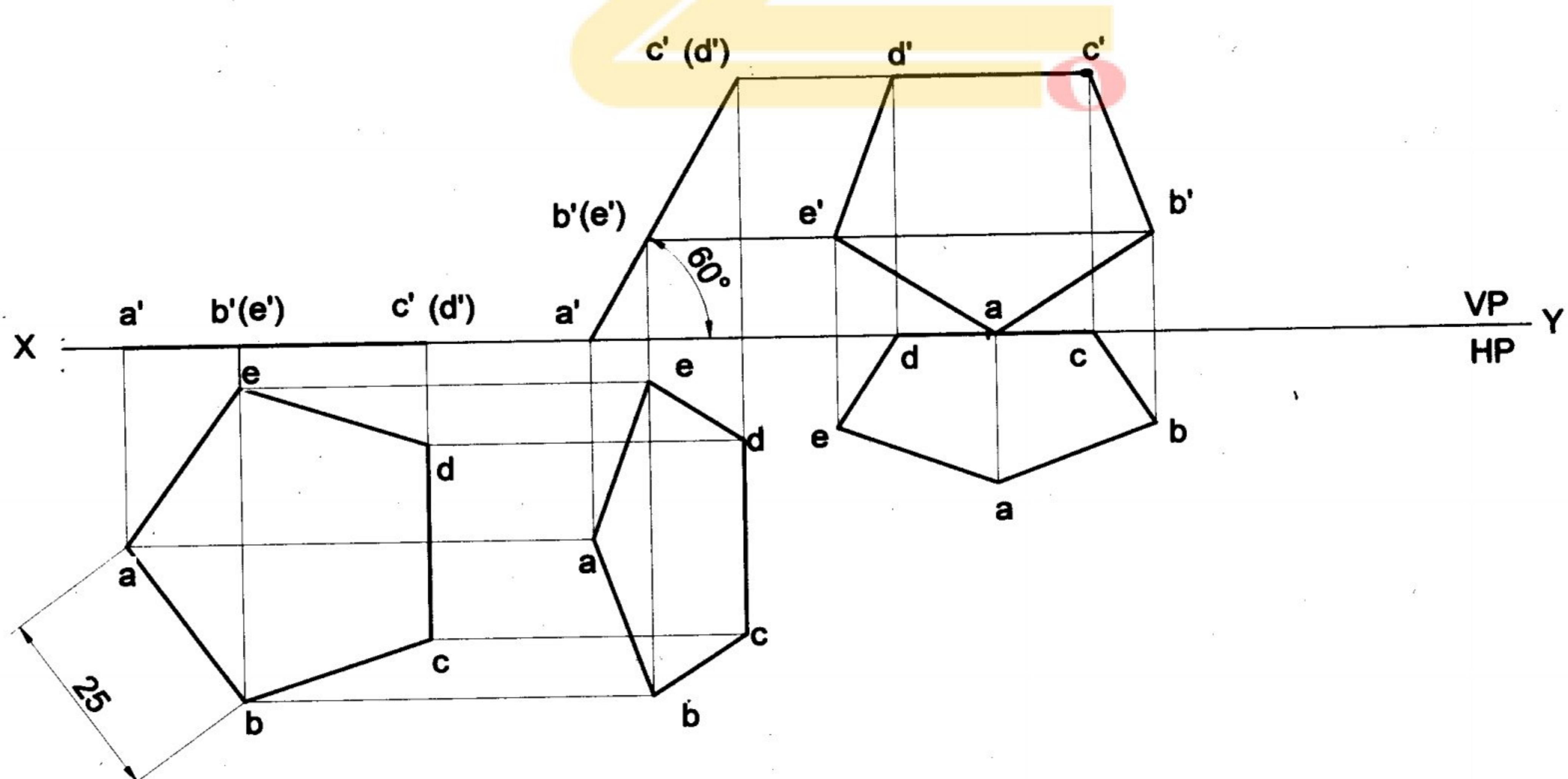
**Problem 25** A pentagonal lamina of sides 25mm is having a side both on HP and VP. The surface of the lamina is inclined at an angle of  $60^\circ$  with HP. Draw the top and front views of the lamina.

**Solution**



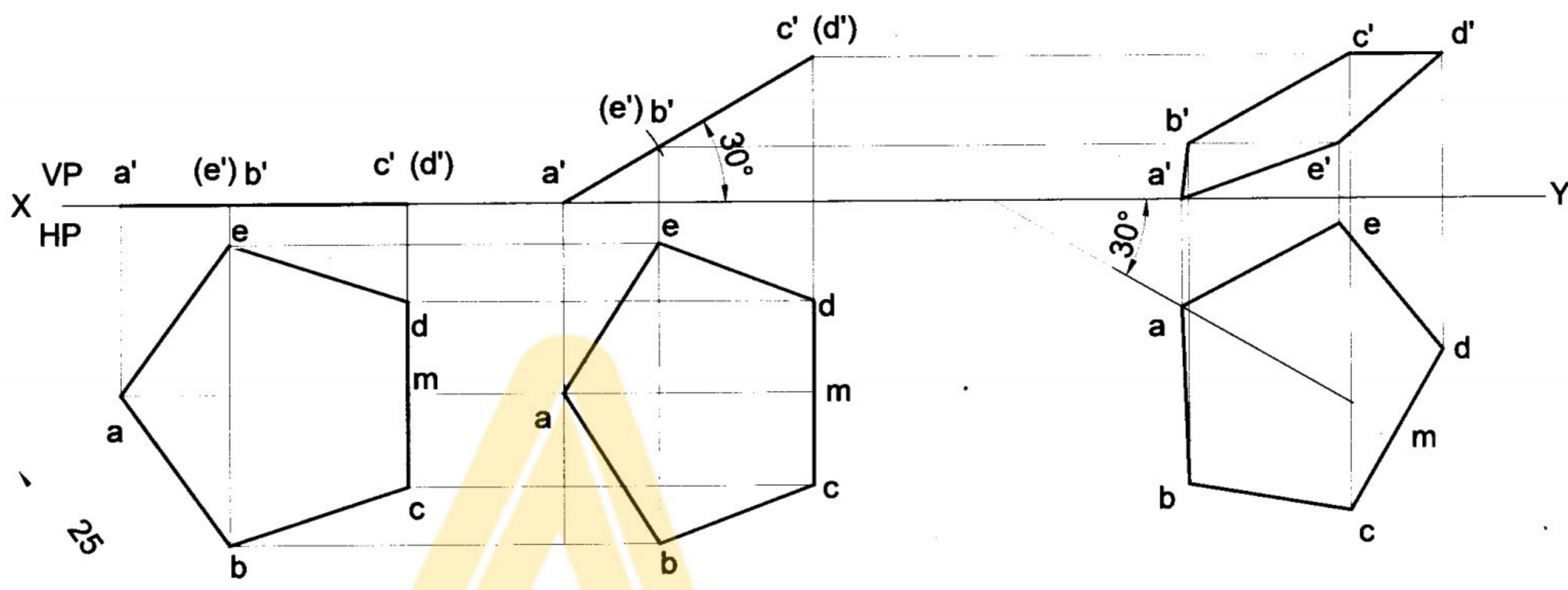
**Problem 26** A regular pentagonal lamina of 25mm side is resting on one of its corners on HP while the side opposite to this corner touches VP. If the lamina makes an angle of  $60^\circ$  with HP and  $30^\circ$  with VP, draw the projections of the lamina.

**Solution**



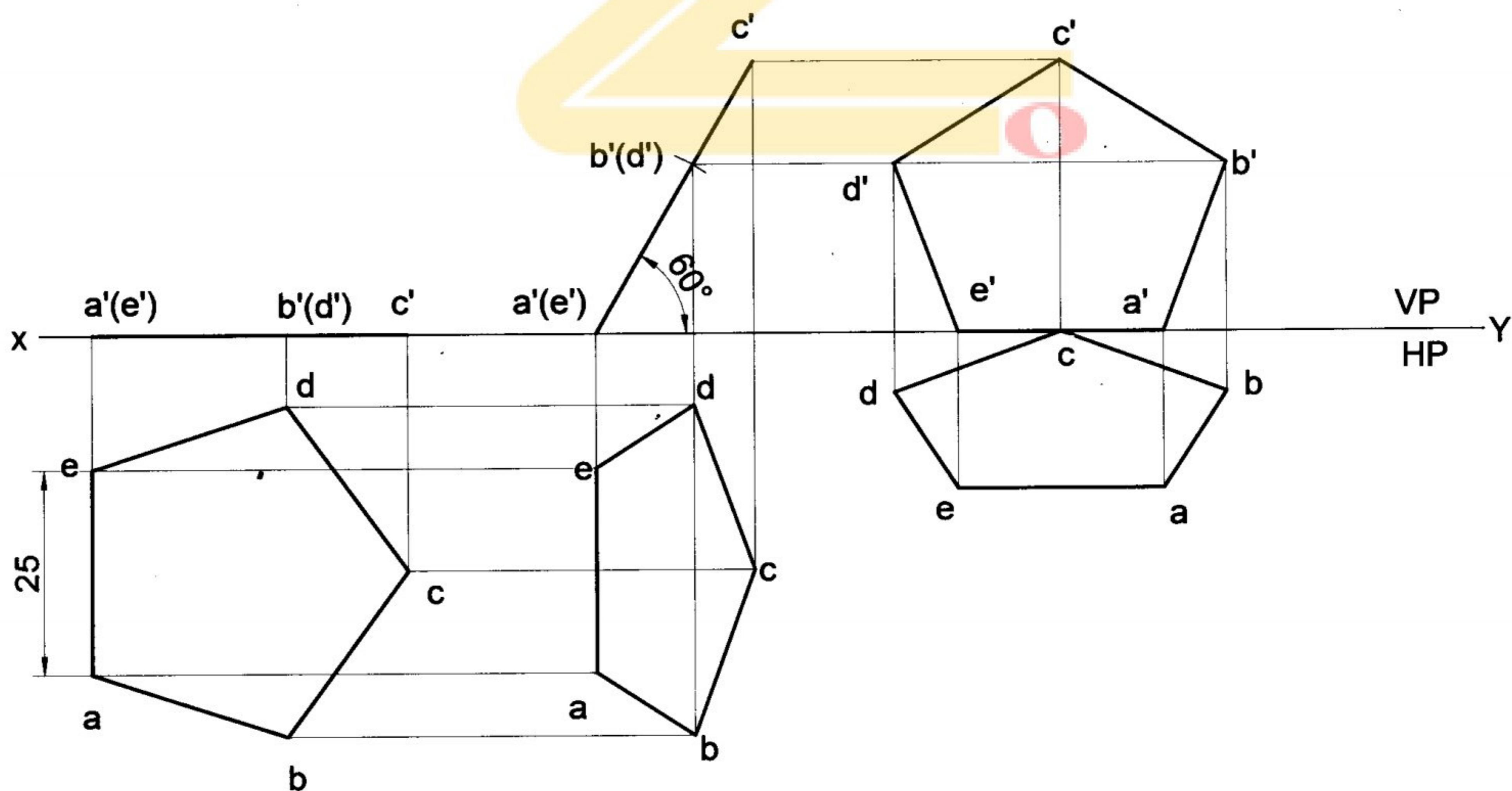
**Problem 27** A pentagonal lamina having edges 25mm is placed on one of its corners on HP such that the surface makes an angle  $30^\circ$  with HP and perpendicular bisector of the edge passing through the corner on which the lamina rests appears to be inclined at  $30^\circ$  to VP. Draw the top and front views of the lamina.

**Solution**



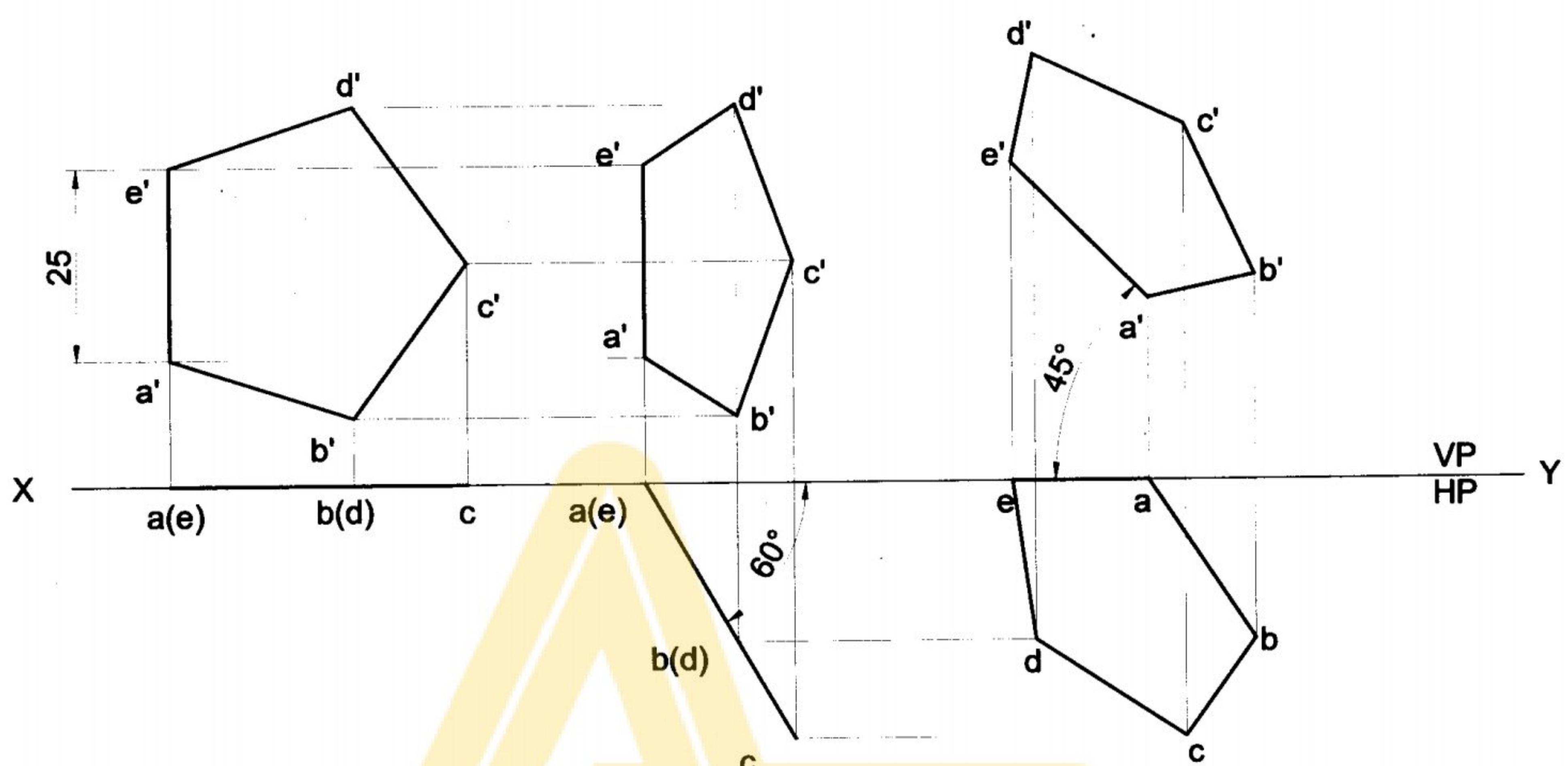
**Problem 28** A regular pentagonal lamina of 25mm side is resting on one of its sides on HP while the corner opposite to this side touches VP. If the lamina makes an angle of  $60^\circ$  with HP and  $30^\circ$  with VP, draw the projections of the lamina.

**Solution**



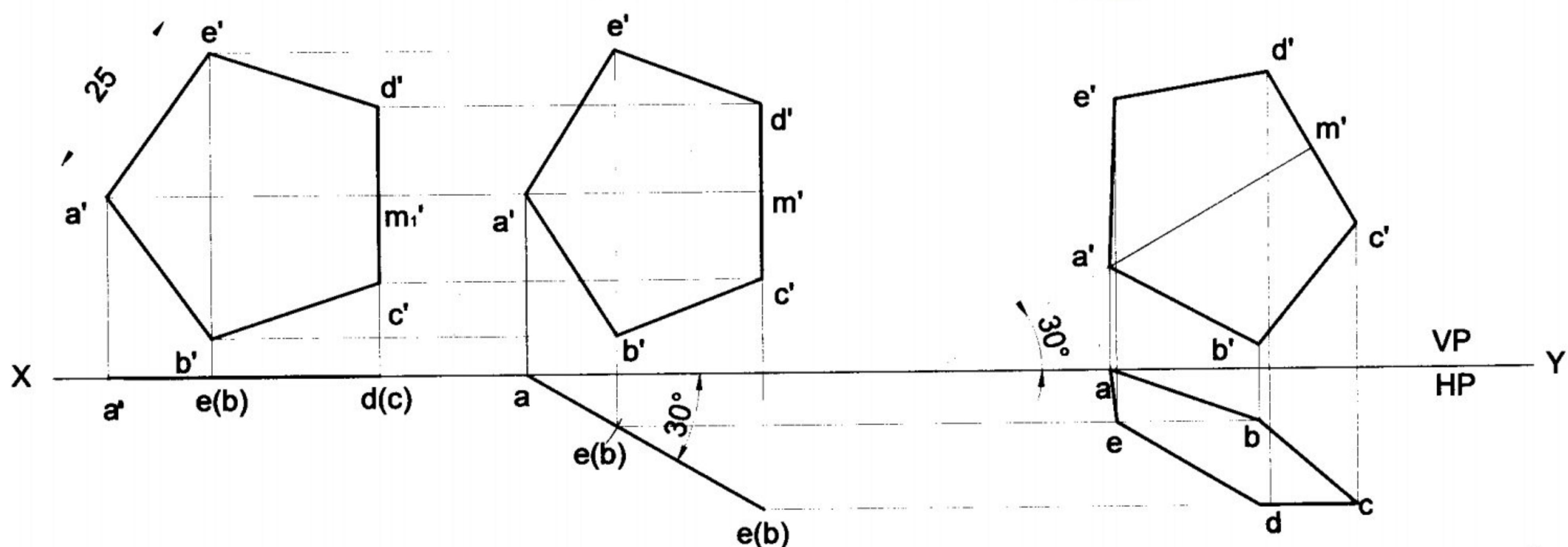
**Problem 29** A pentagonal lamina of edges 25mm is resting on VP with one of its sides such that the surface makes an angle of  $60^\circ$  with VP. The edge on which it rests is inclined at  $45^\circ$  to HP. Draw its projections.

**Solution**



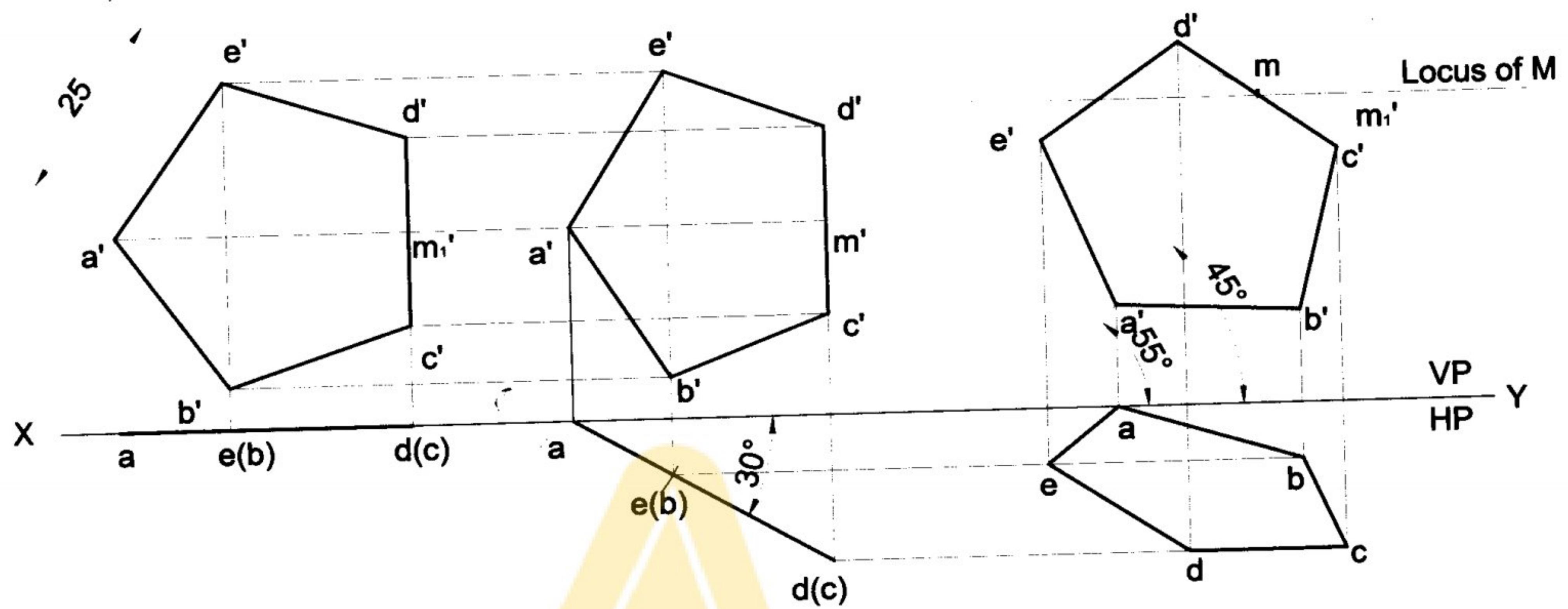
**Problem 30** A pentagonal lamina having edges 25mm is placed on one of its corners on VP such that the surface makes an angle  $30^\circ$  with VP and perpendicular bisector of the edge passing through the corner on which the lamina rests appears to be inclined at  $30^\circ$  to HP. Draw the top and front views of the lamina.

**Solution**



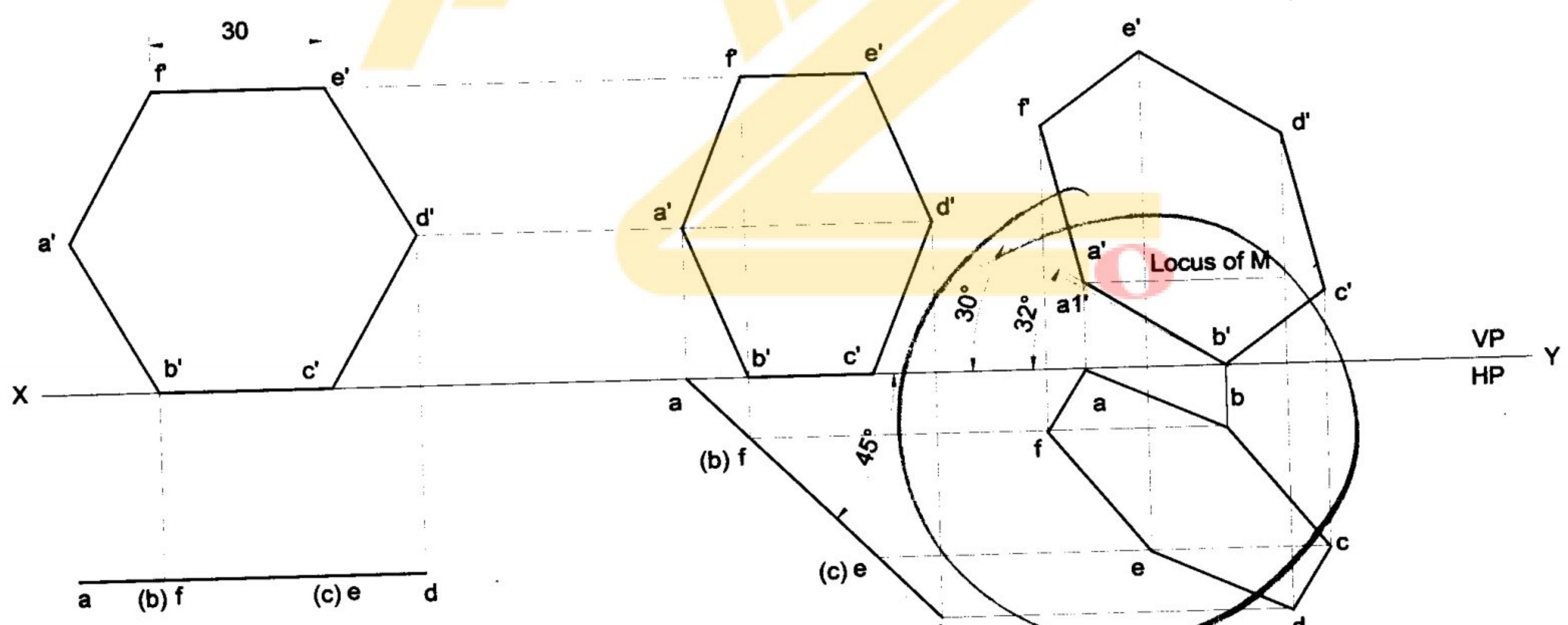
**Problem 31** A pentagonal lamina having edges 25mm is placed on one of its corners on VP such that the surface makes an angle  $30^\circ$  with VP and perpendicular bisector of the edge passing through the corner on which the lamina rests is inclined at  $45^\circ$  to HP. Draw the top and front views of the lamina.

**Solution**



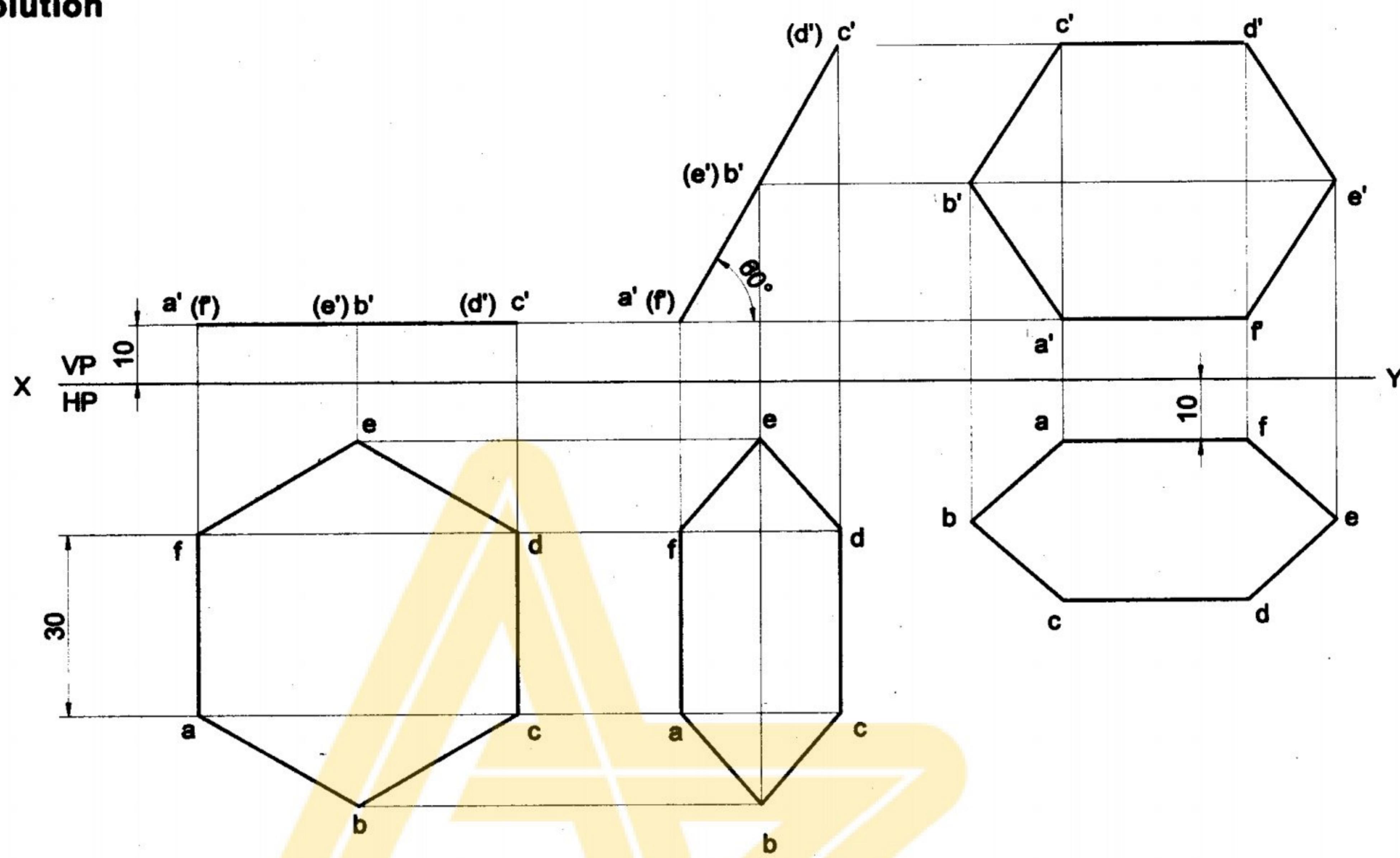
**Problem 32** A hexagonal lamina of 30mm sides rests on HP with one of its corners touching VP and surface inclined at  $45^\circ$  to it. One of its edges is inclined to HP at  $30^\circ$ . Draw the front and top views of the lamina in its final position.

**Solution**



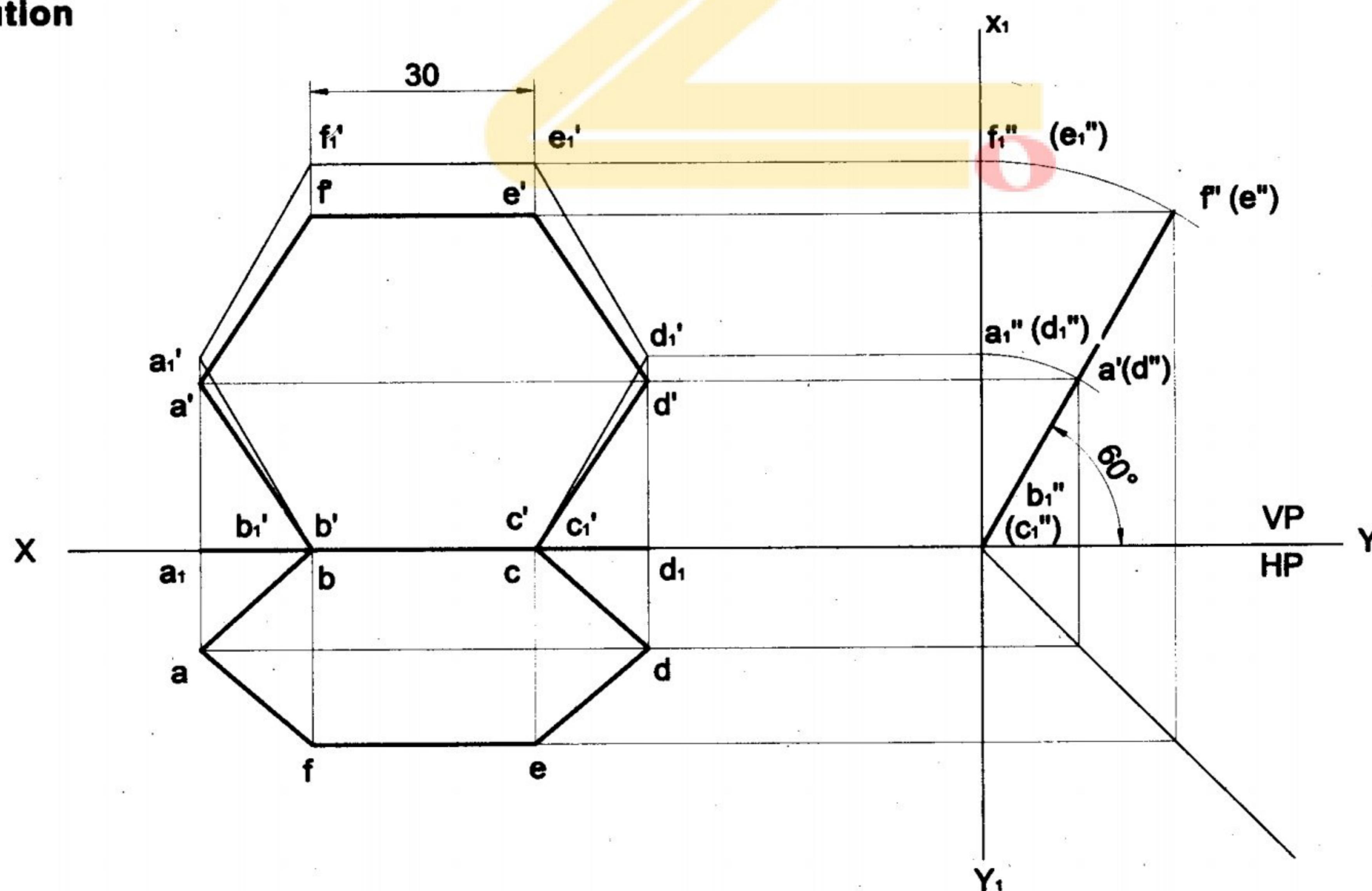
**Problem 33** Draw the top and front views of a hexagonal lamina of 30mm sides having two of its edges parallel to both vertical and horizontal planes and one of its edges is 10mm from each of the planes of projection. The surface of the lamina is inclined at an angle of  $60^\circ$  to the HP.

**Solution**



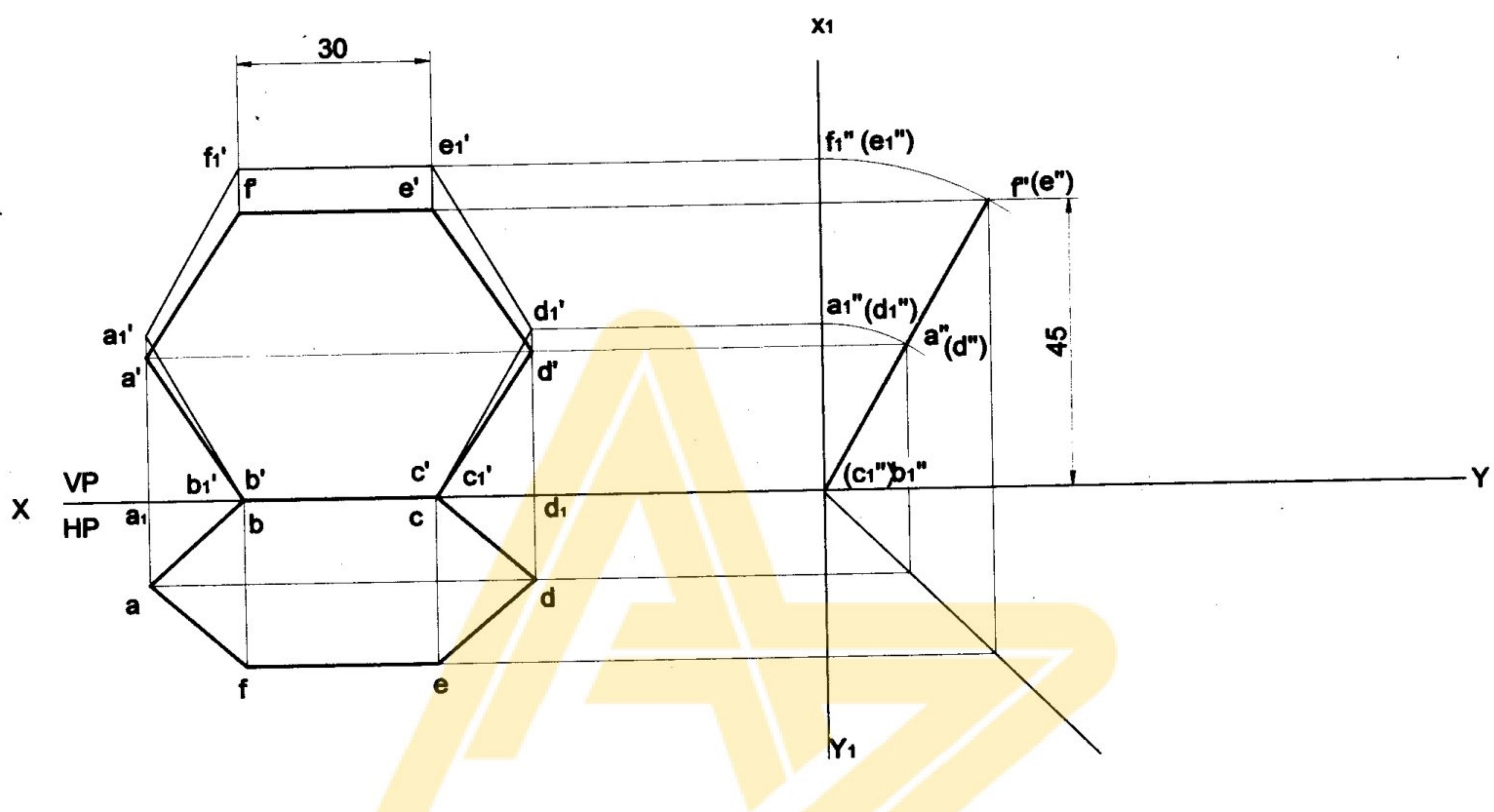
**Problem 34** A regular hexagonal lamina of sides 30mm is lying in such a way that one of its sides touches both the reference planes. If the lamina makes  $60^\circ$  with HP, draw the projections of the lamina.

**Solution**



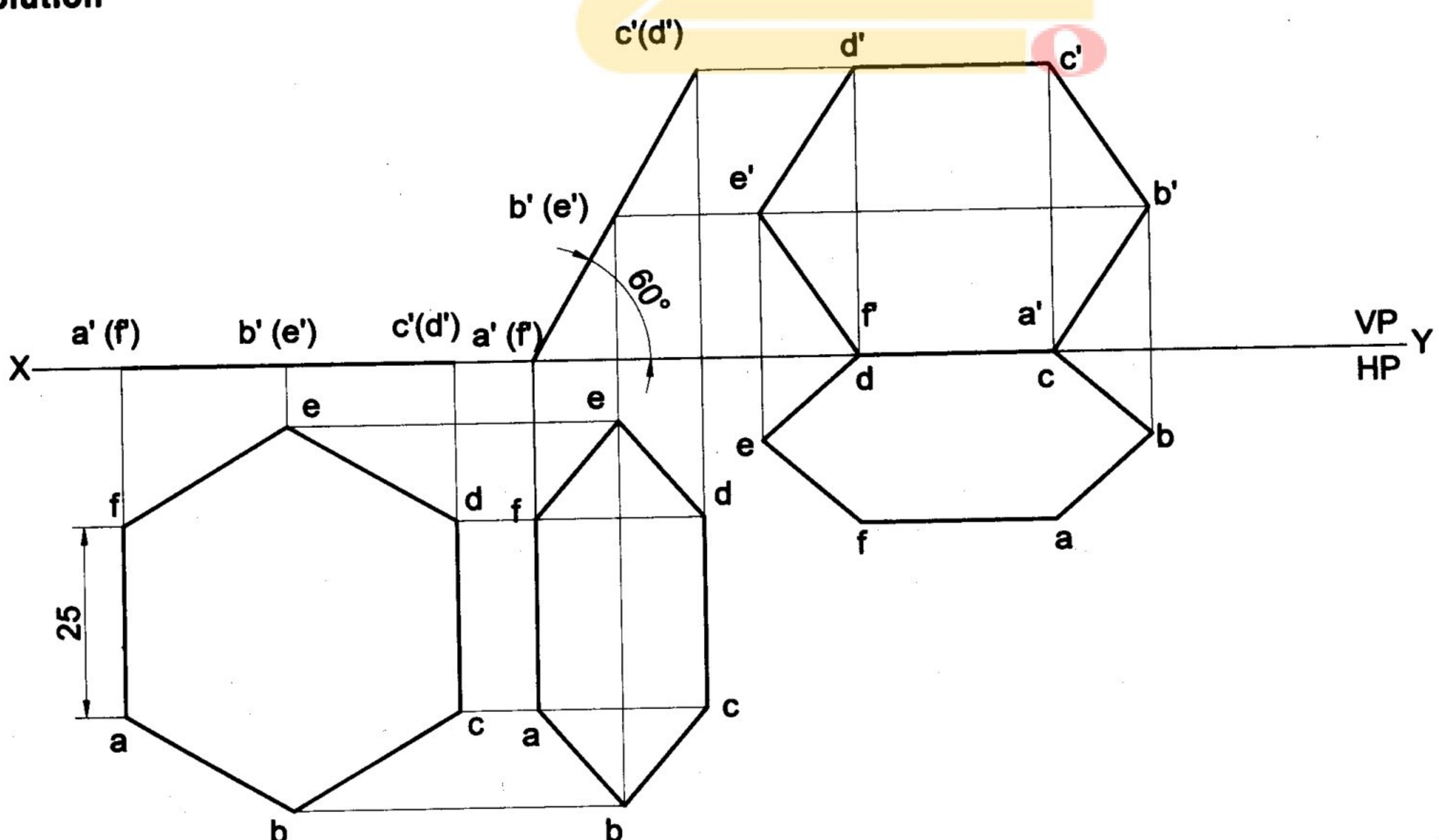
**Problem 35** A regular hexagonal lamina of side 30mm is lying in such a way that one of its sides touches both the reference planes. If the side opposite to the side on which it rests is 45mm above HP, draw the projections of the lamina.

**Solution**



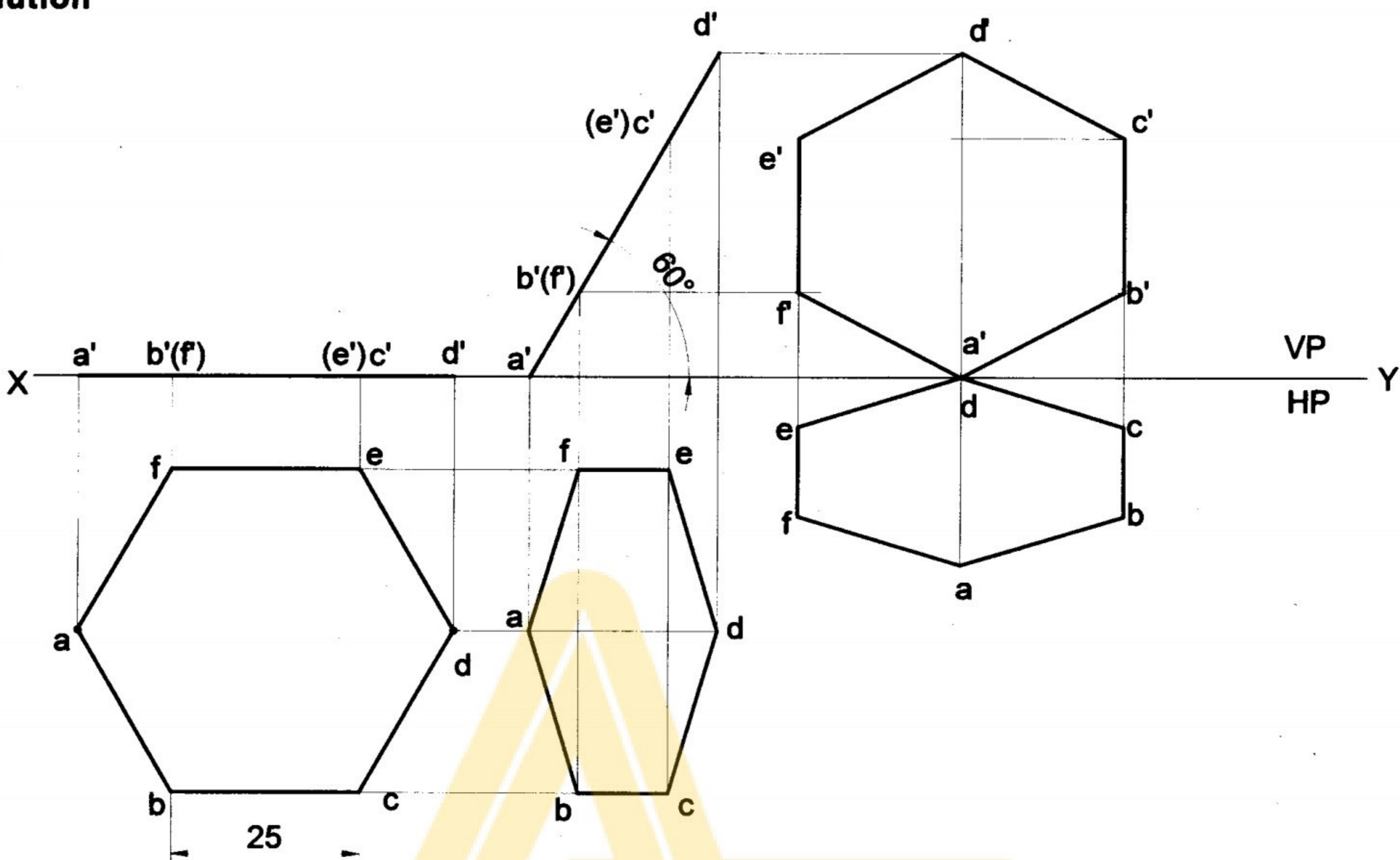
**Problem 36** A regular hexagonal lamina of sides 25mm is lying in such a way that one of its sides on HP while the side opposite to the side on which it rests is on VP. If the lamina makes  $60^\circ$  to HP, Draw the projections of the lamina.

**Solution**



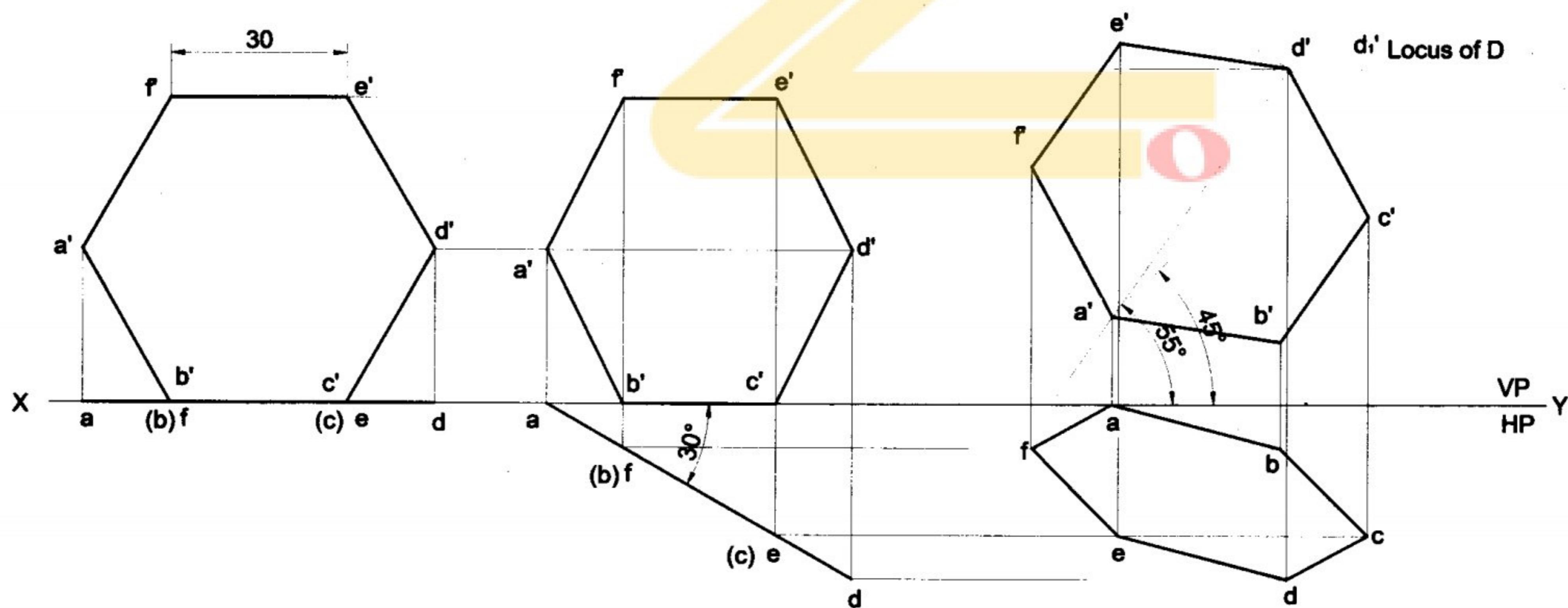
**Problem 37** A regular hexagonal lamina of side 25mm is lying in such a way that one of its corners on HP while the corner opposite to the corner on which it rests is on VP. If the lamina makes  $60^\circ$  to HP, Draw the projections of the lamina.

**Solution**



**Problem 38** A hexagonal lamina of sides 30mm is resting on HP with one of its corners in VP and its surface inclined at an angle of  $30^\circ$  with VP. The diagonal passing through that corner which is in VP is inclined at  $45^\circ$  to HP. Draw the projections of the lamina.

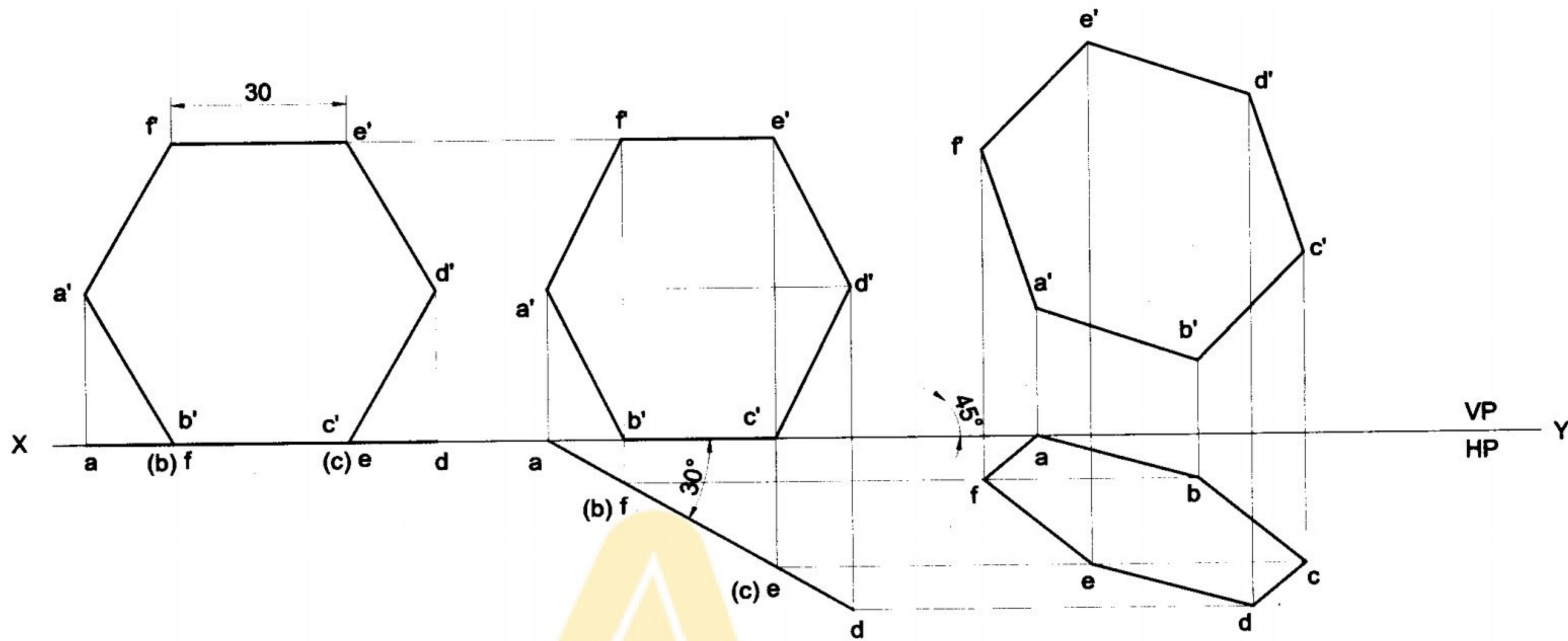
**Solution**



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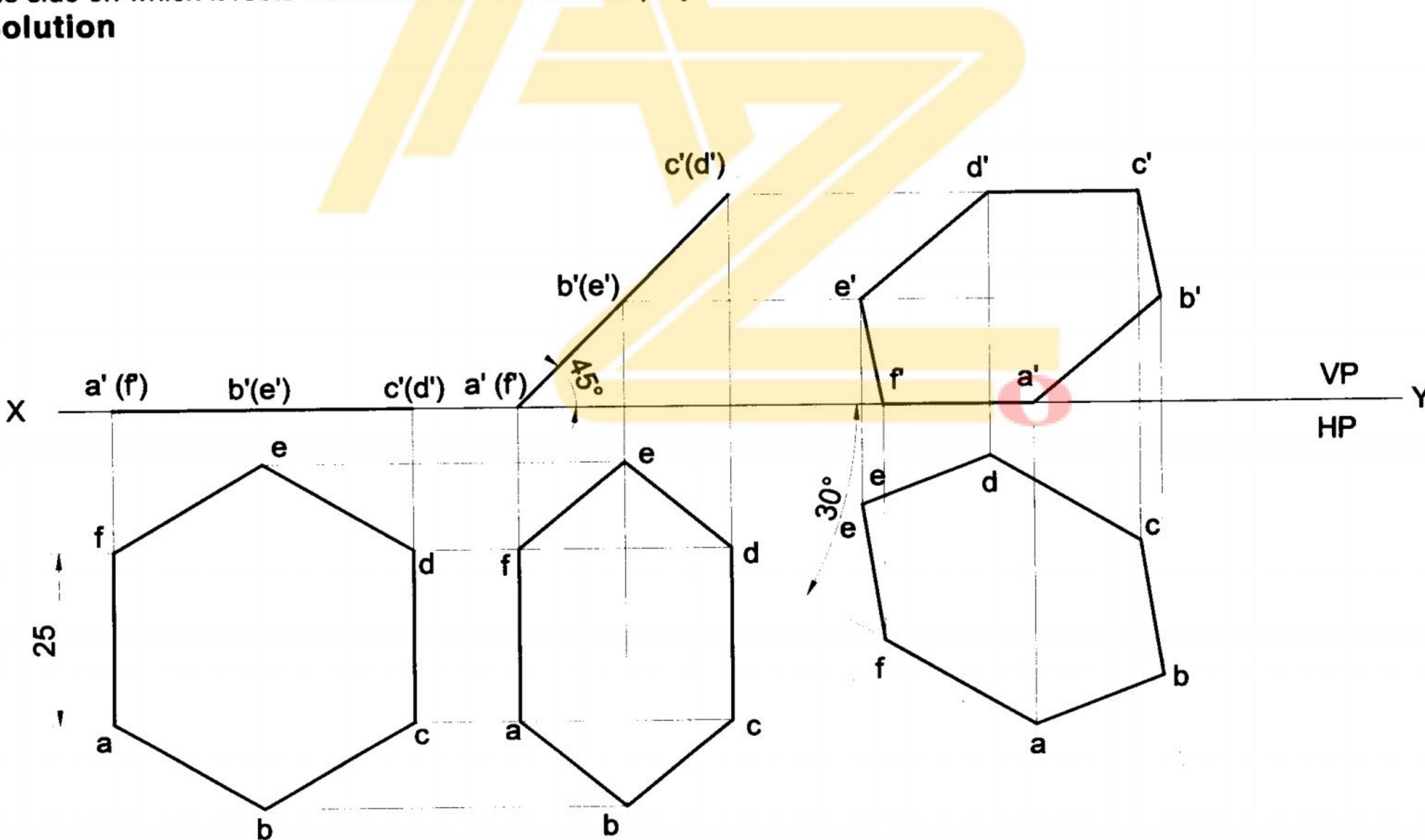
**Problem 39** A hexagonal lamina of sides 30mm is resting on HP with one of its corners in VP and its surface inclined at an angle of  $30^\circ$  with VP. The diagonal passing through that corner which is in VP appears to be inclined at  $40^\circ$  to HP. Draw the projections of the lamina.

**Solution**



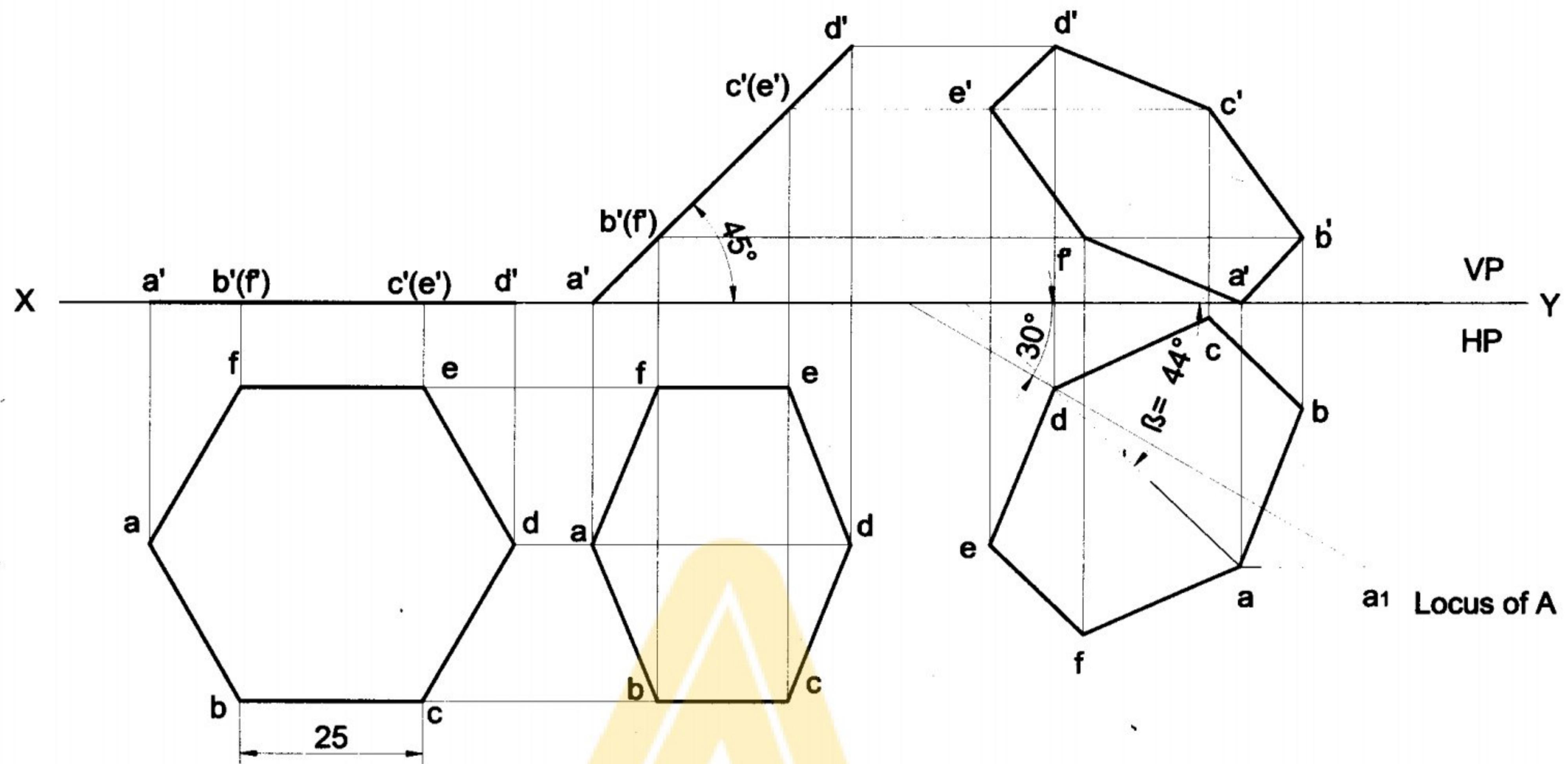
**Problem 40** A hexagonal lamina of sides 25mm rests on one of its sides on HP. The lamina makes  $45^\circ$  to HP and the side on which it rests makes  $30^\circ$  to VP. Draw its projections.

**Solution**



**Problem 41** A hexagonal lamina of sides 25mm rests on one of its corners on HP. The lamina makes  $45^\circ$  to HP and the diagonal passing through the corner on which it rests is inclined at  $30^\circ$  to VP. Draw its projections.

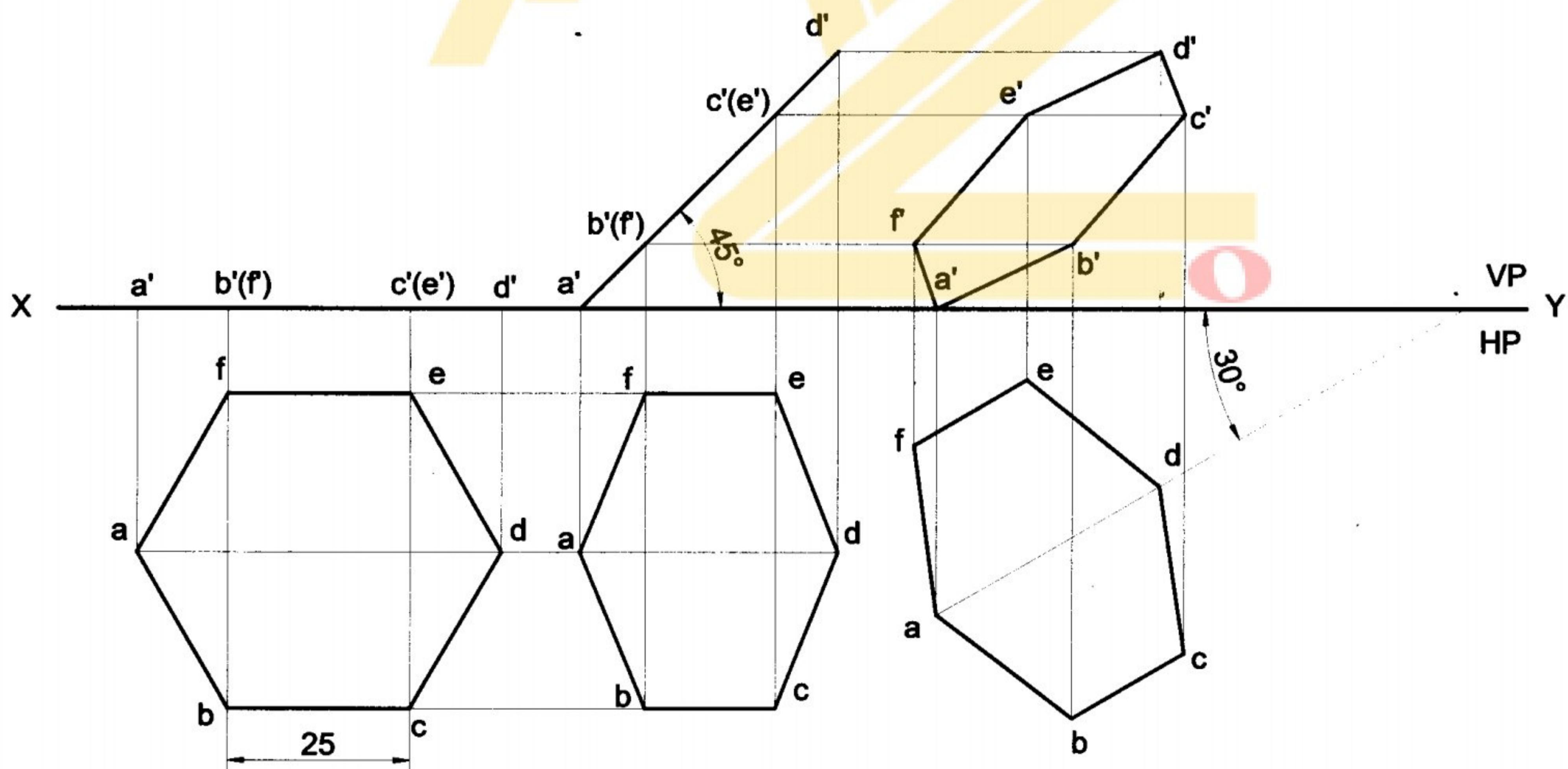
**Solution**



a<sub>1</sub> Locus of A

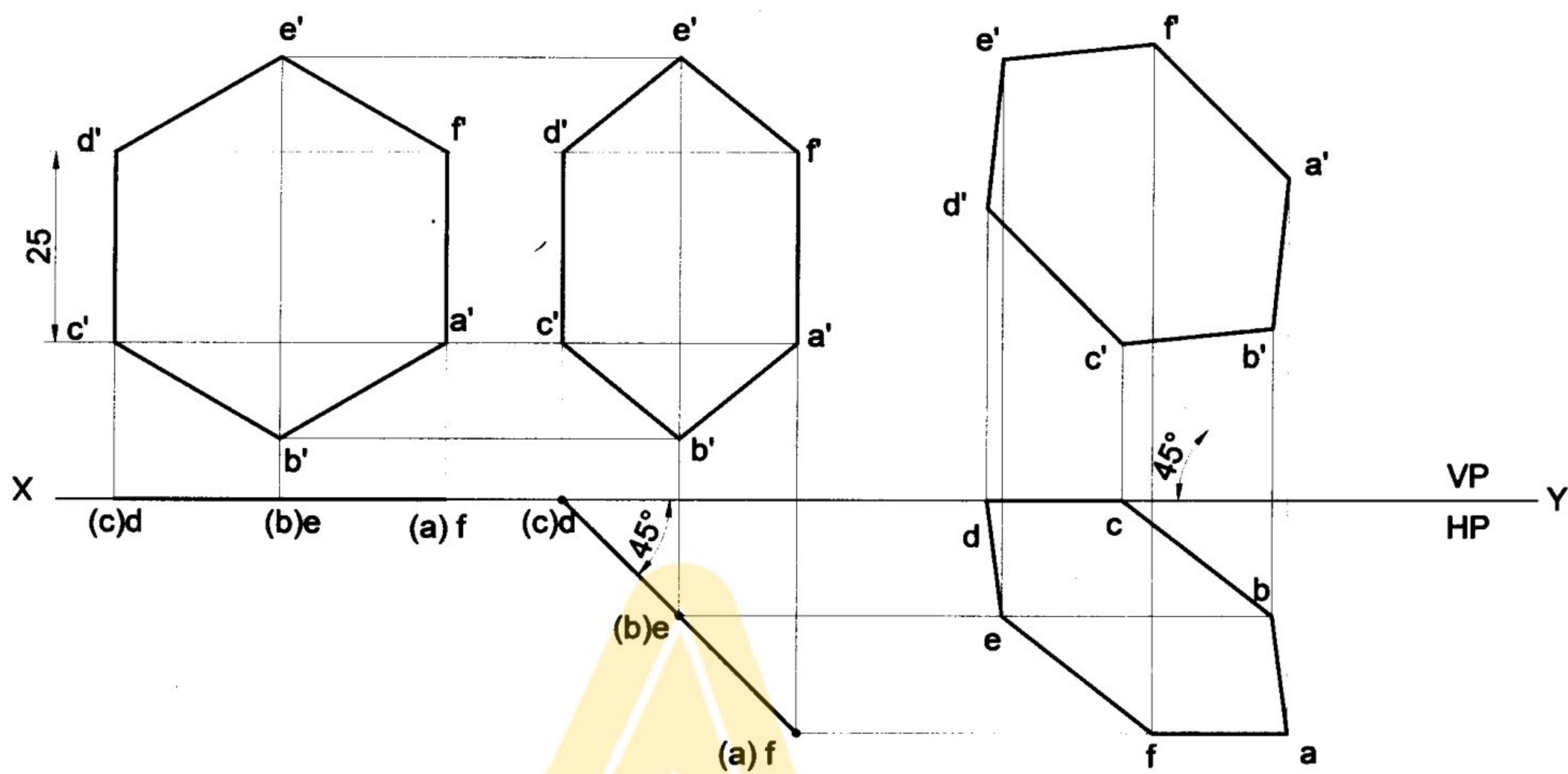
**Problem 42** A hexagonal lamina of sides 25mm rests on one of its corners on HP. The lamina makes  $45^\circ$  to HP and the diagonal passing through the corner on which it rests appears to be inclined at  $30^\circ$  to VP. Draw its projections.

**Solution**



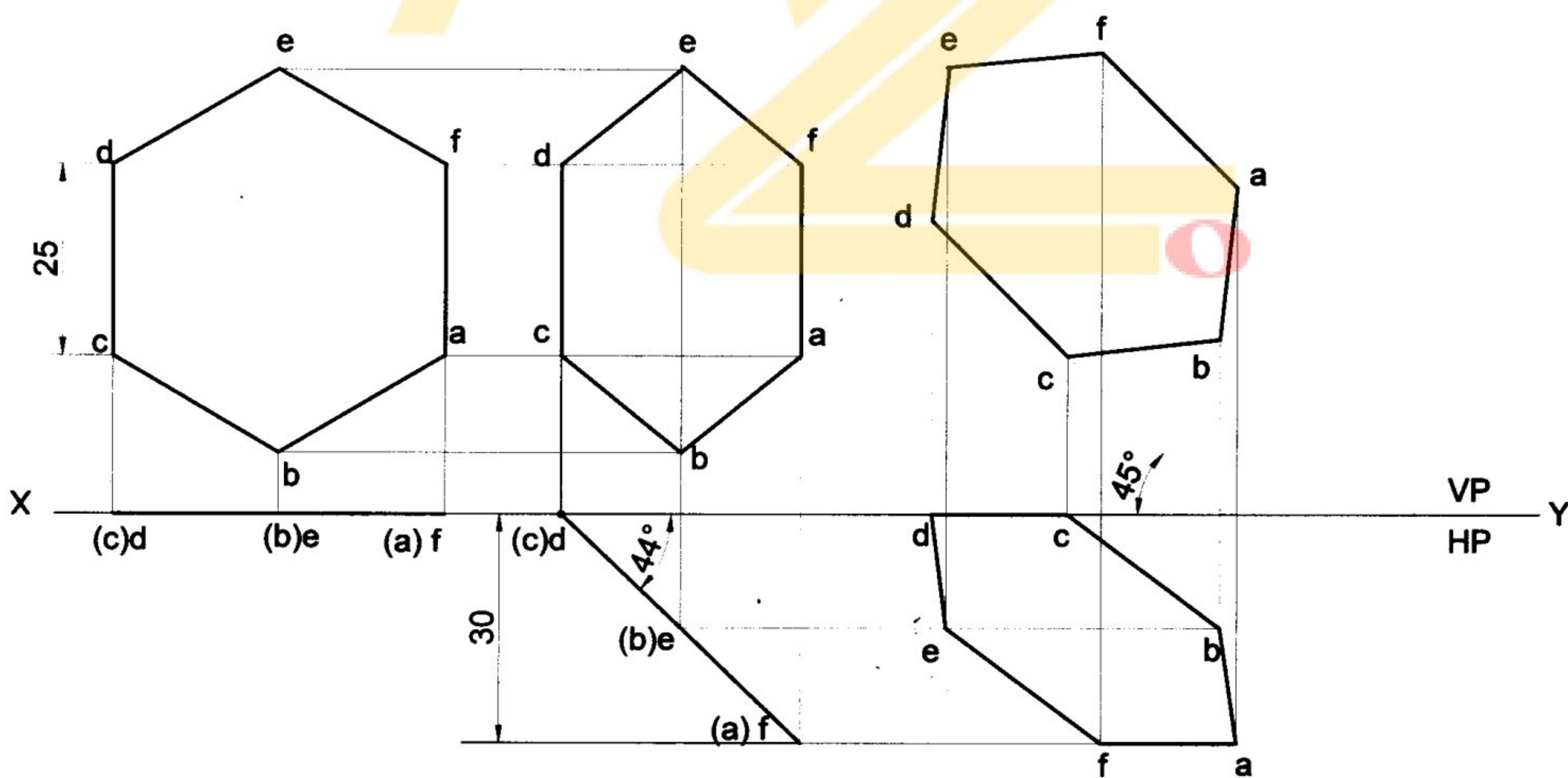
**Problem 43** A hexagonal lamina of sides 25mm rests on one of its sides on VP. The lamina makes  $45^\circ$  to VP and the side on which it rests makes  $45^\circ$  to HP. Draw its projections.

**Solution**



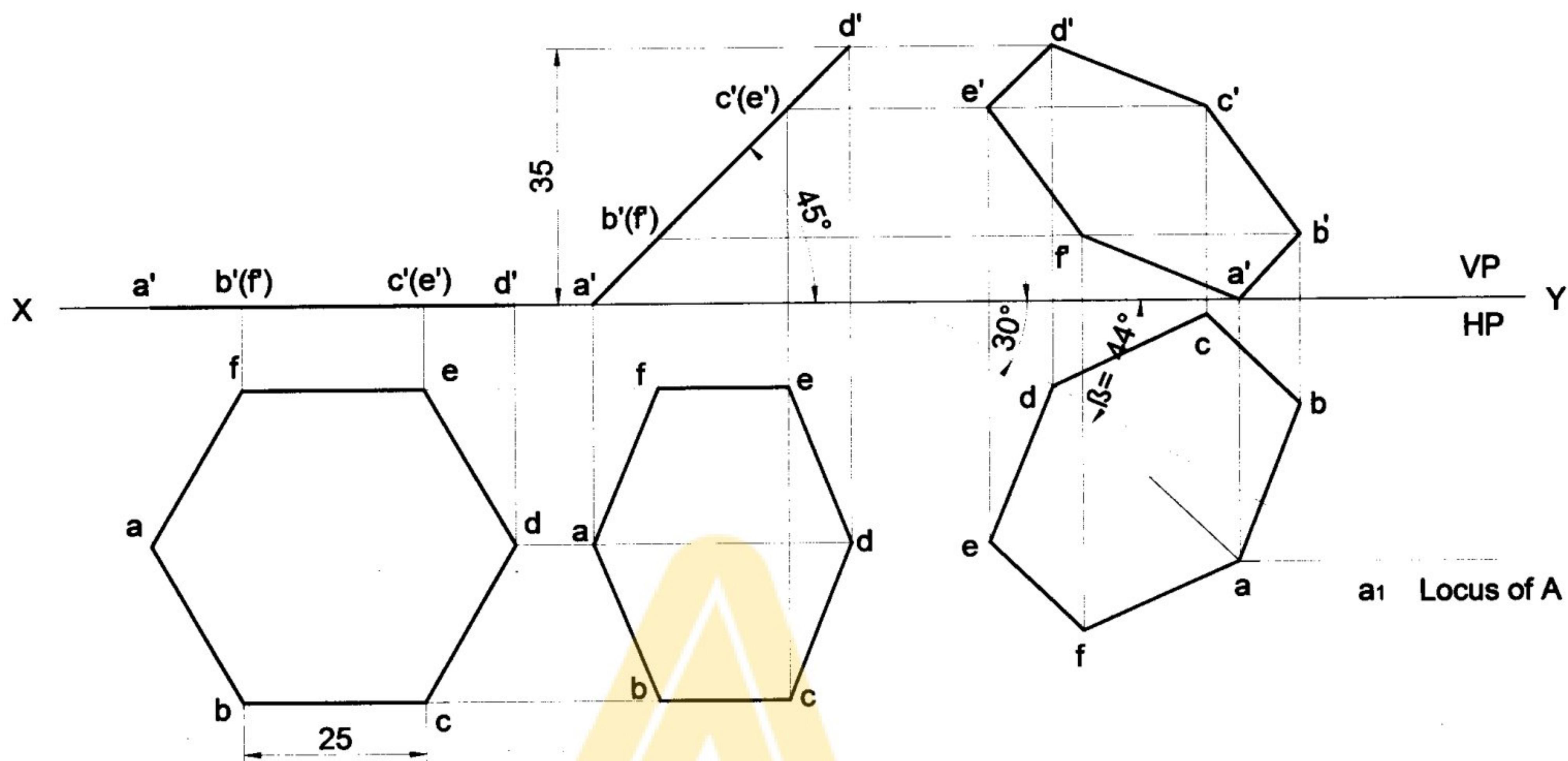
**Problem 44** A hexagonal lamina of sides 25mm rests on one of its sides on VP. The side opposite to the side on which it rests is 30mm in front of VP & the side on which it rests makes  $45^\circ$  to HP. Draw its projections. Also determine the inclination of the lamina with the reference plane.

**Solution**



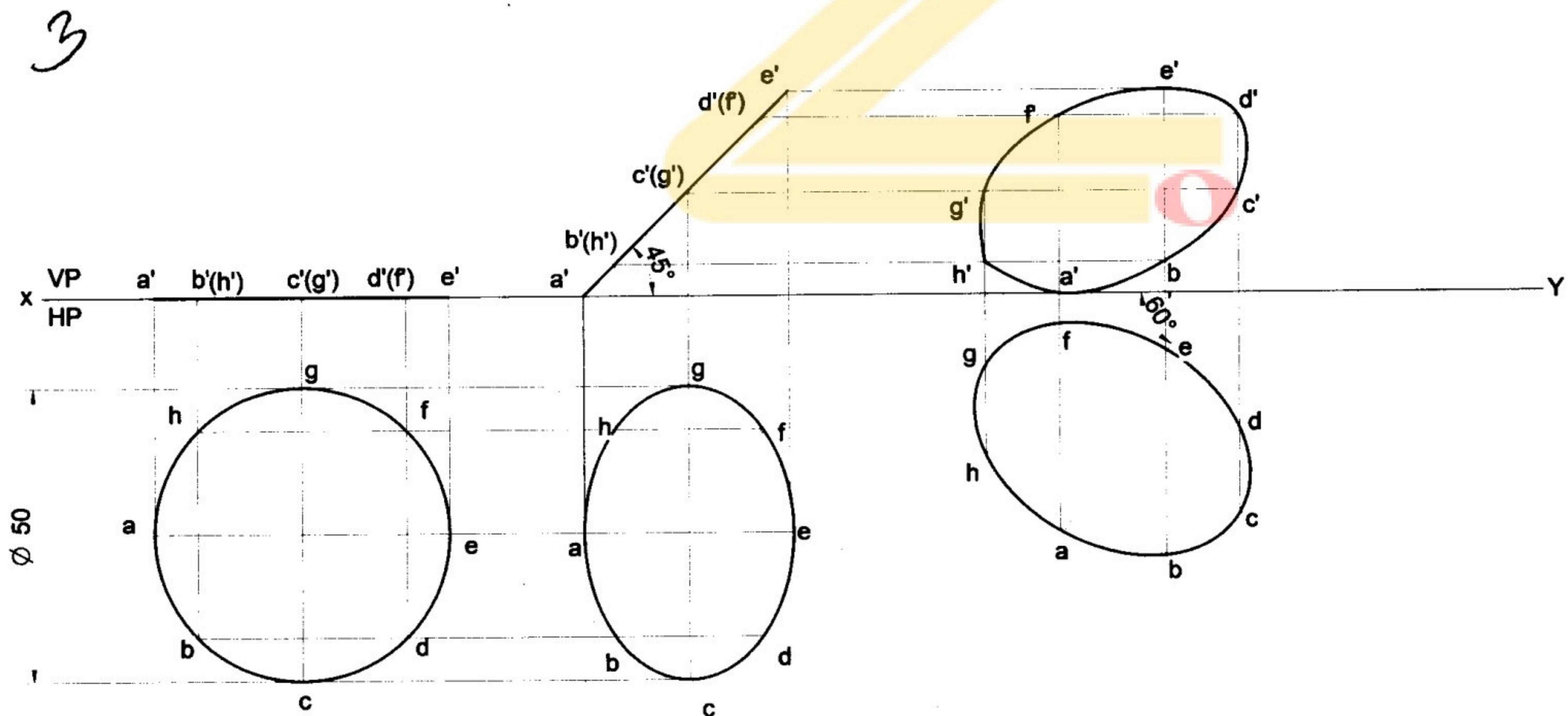
**Problem 45** A hexagonal lamina of sides 25mm rests on one of its corners on HP. The corner opposite to the corner on which it rests is 35mm above HP and the diagonal passing through the corner on which it rests is inclined at  $30^\circ$  to VP. Draw its projections. Find the inclination of the surface with HP.

**Solution**



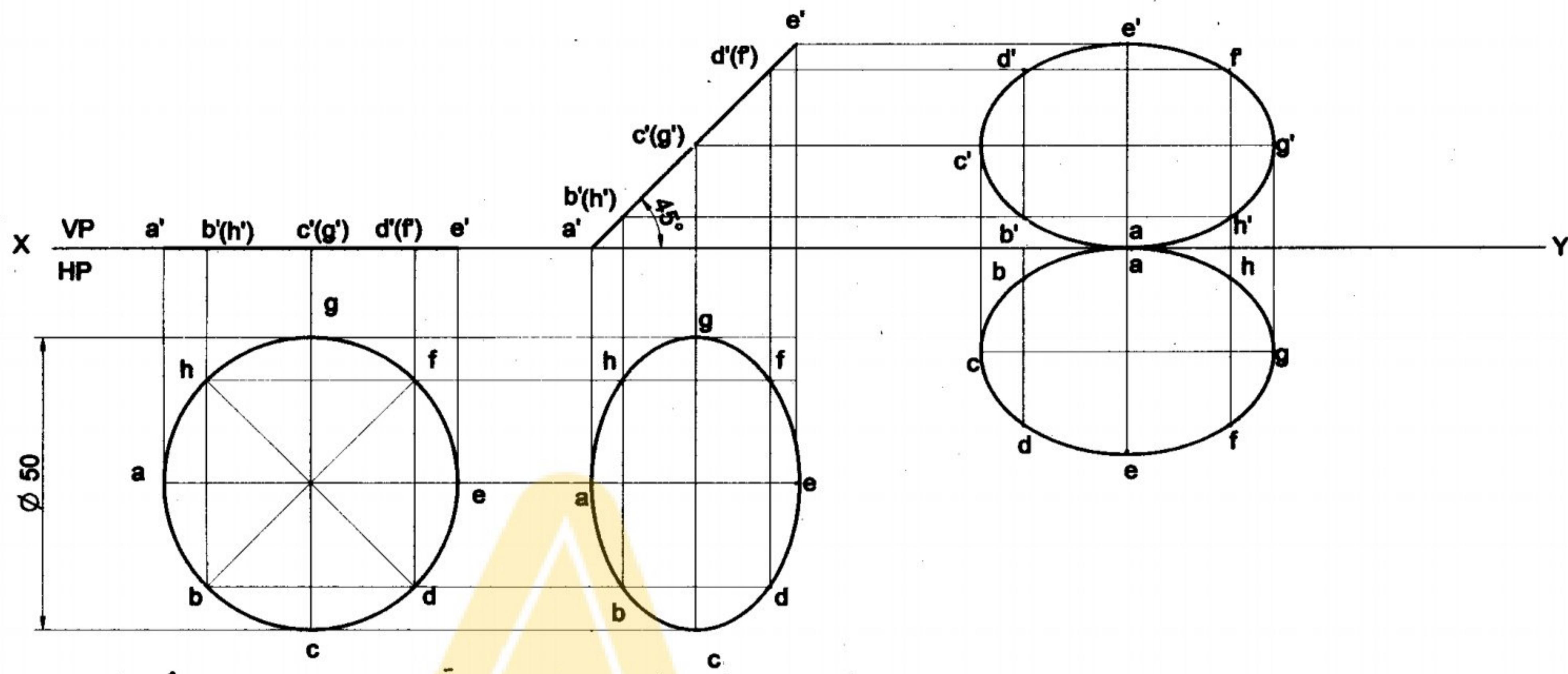
**Problem 46** Draw the projections of a circular plate of negligible thickness of 50mm diameter resting on HP on a point A on the circumference, with its plane inclined at  $45^\circ$  to HP and the top view of the diameter passing through the resting point makes  $60^\circ$  with VP.

**Solution**



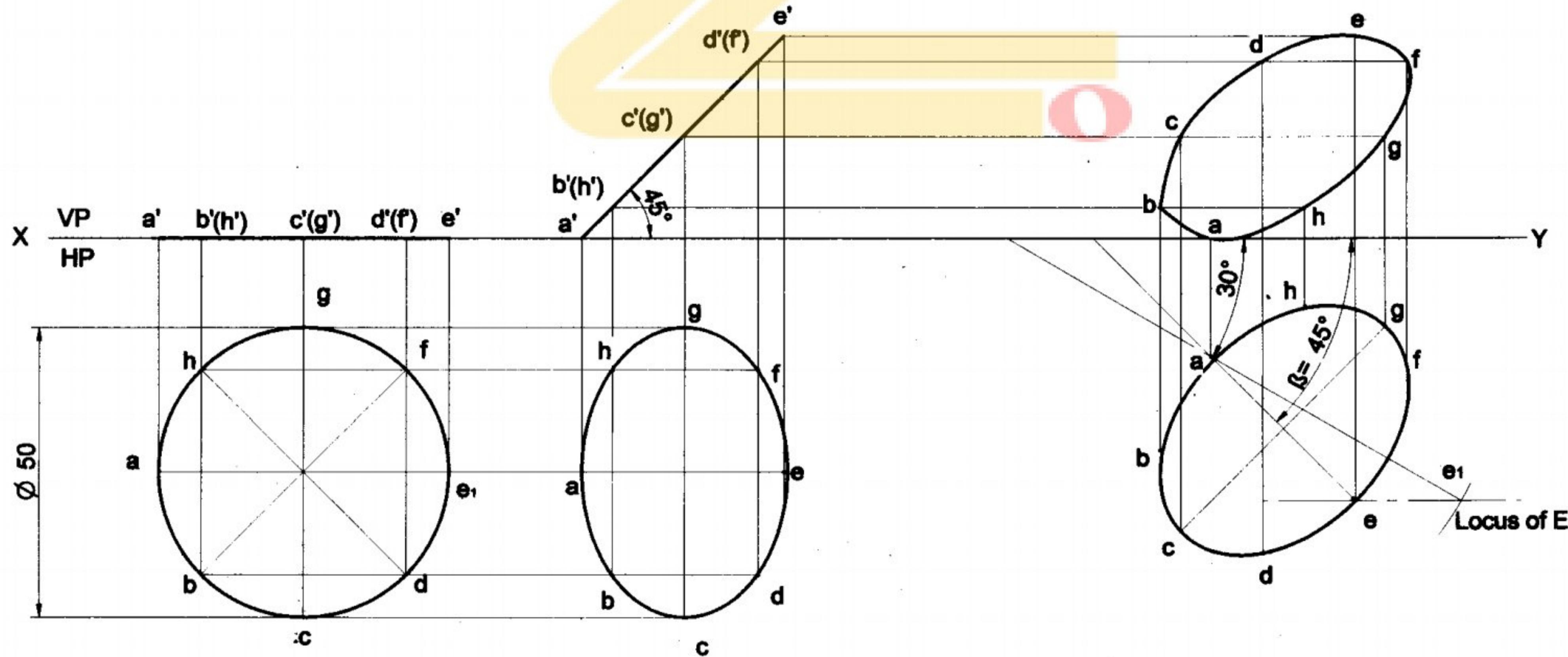
**Problem 47** A circular lamina of 50mm diameter is standing with one of its points on the rim on HP and the lamina inclined at  $45^\circ$  to HP. The diameter at right angles to the diameter which is passing through the point on which the lamina rests is parallel to VP. Draw its projections.

**Solution**



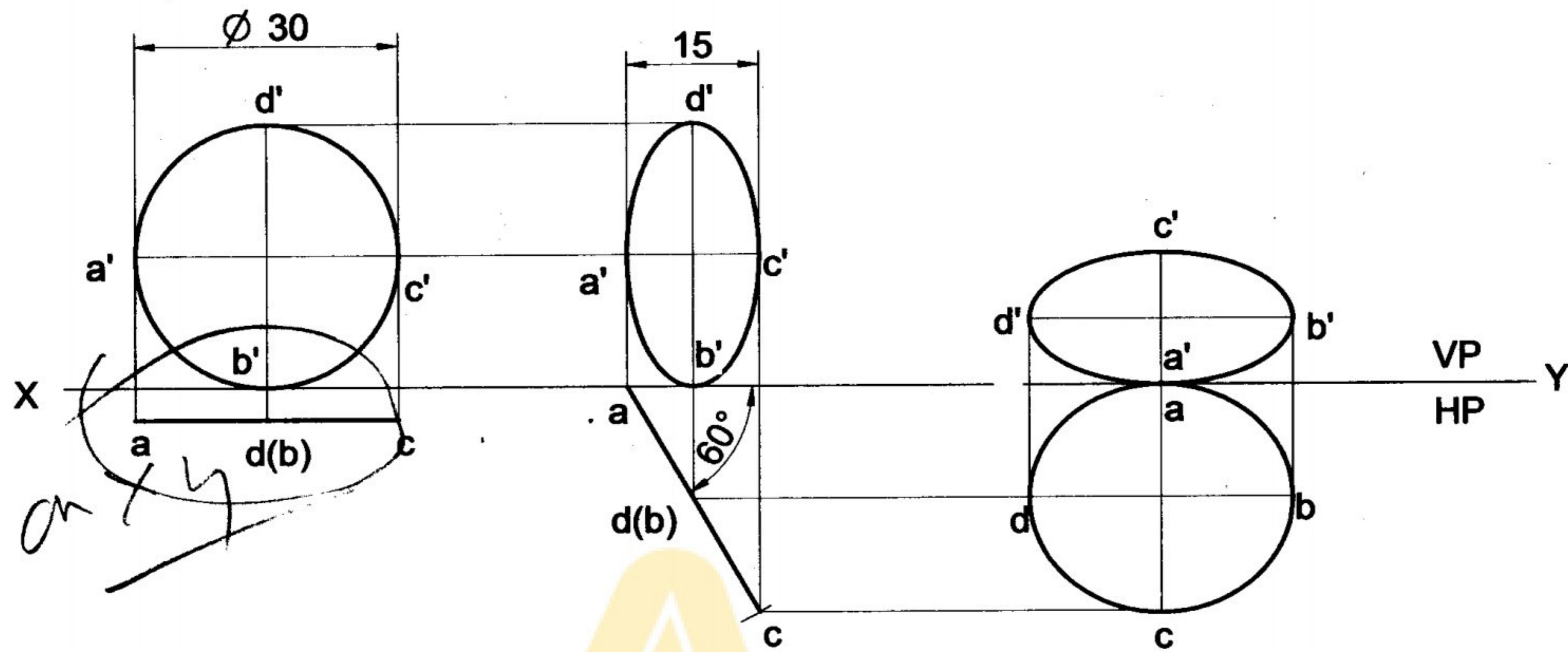
**Problem 48** A circular lamina of 50mm diameter rests on HP such that one of its diameters is inclined at  $30^\circ$  to VP and  $45^\circ$  to HP. Draw its top and front views in this position.

**Solution**



**Problem 49** A circular lamina inclined to the VP appears in the front view as an ellipse of major axis 30mm and minor axis 15mm. The major axis is parallel to both HP and VP. One end of the minor axis is in both the HP and VP. Draw the projections of the lamina and determine the inclination of the lamina with the VP.

**Solution**



**Problem 50** A circular lamina of 30mm diameter rests on VP such that one of its diameters is inclined at 30° to VP and 45° to HP. Draw its top and front views in this position.

**Solution**

