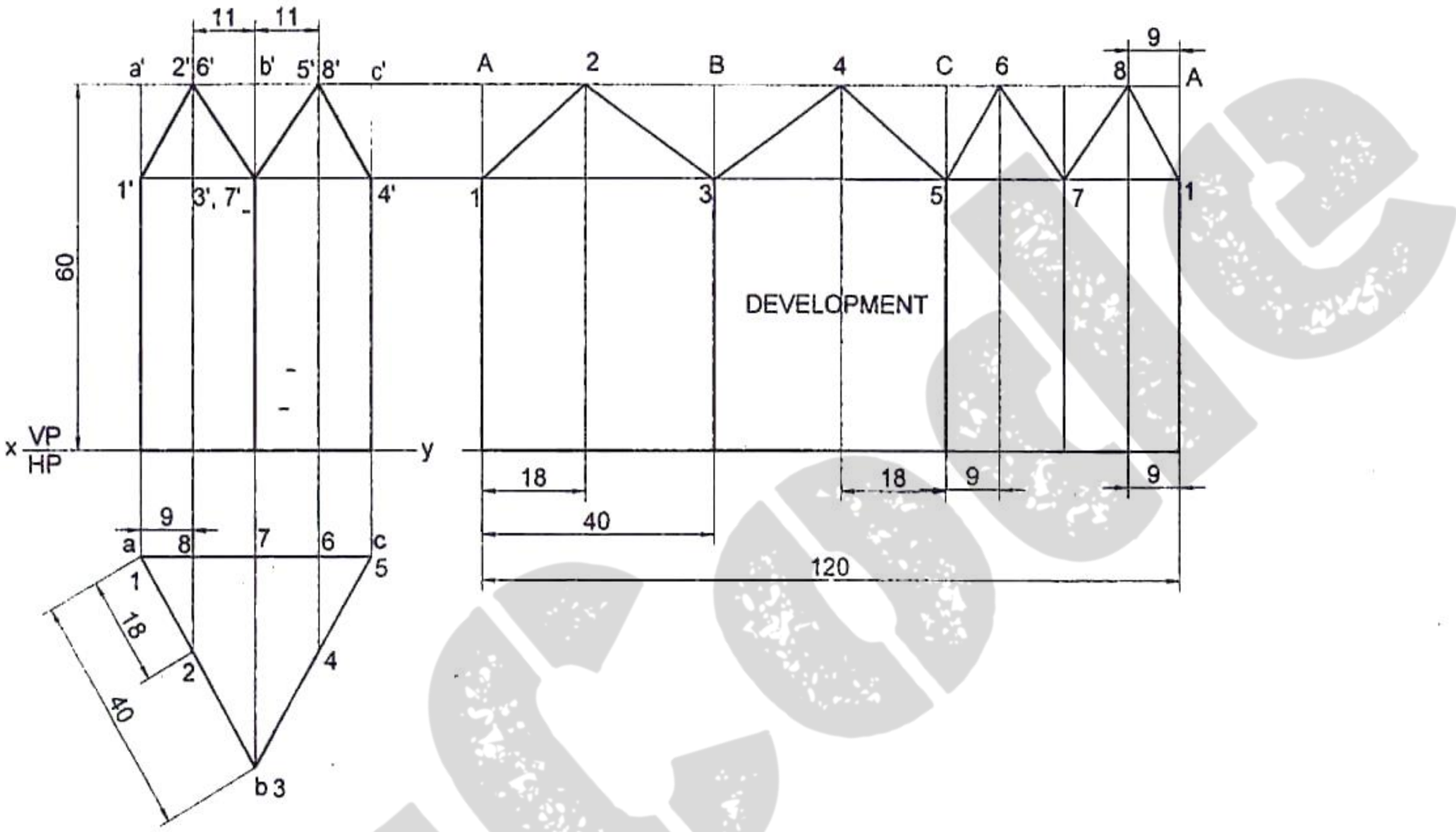
CHAPTER 5

DEVELOPMENT OF LATERAL SURFACES 0F SOLIDS

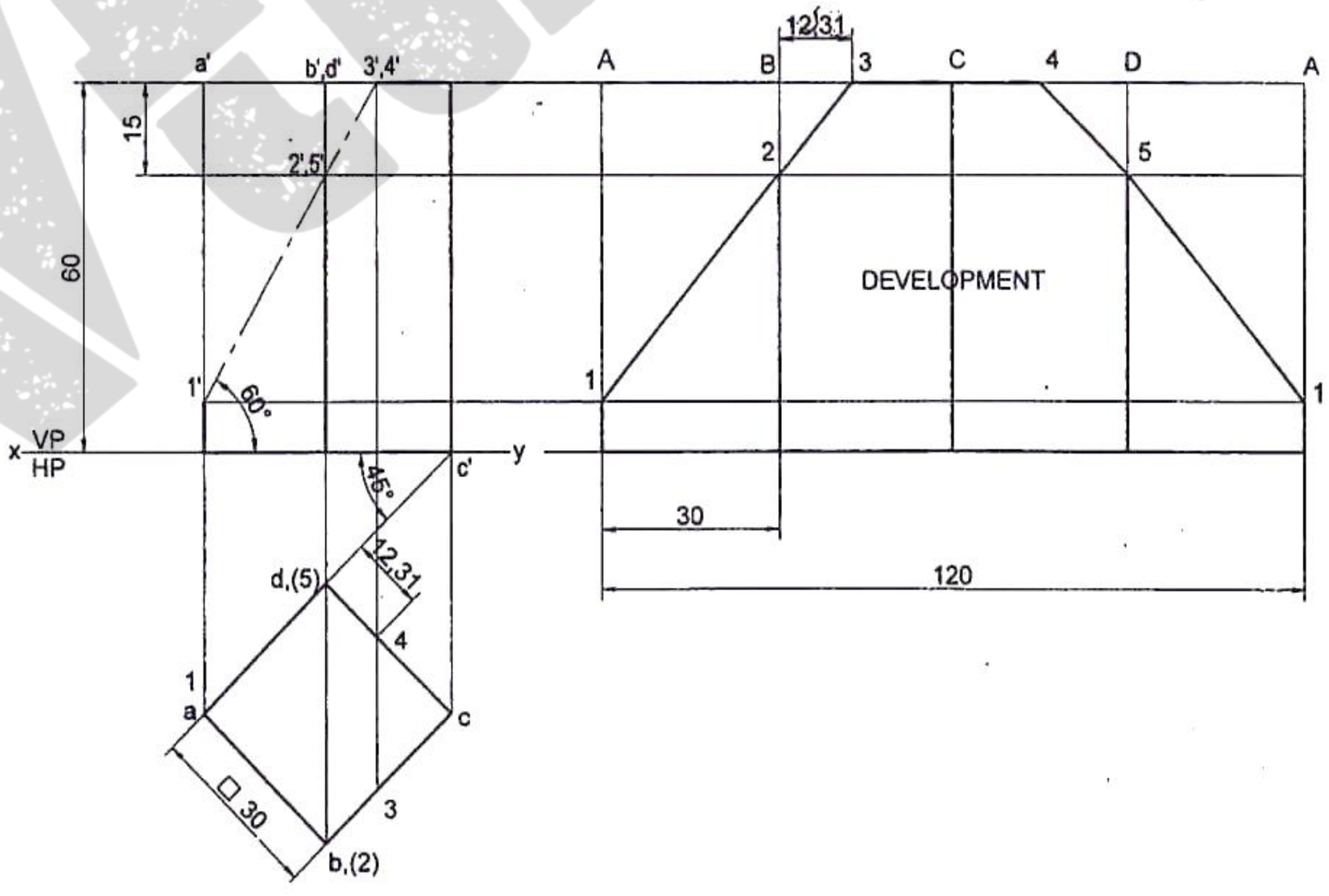
Problem 1 A triangular prism with one of its rectangular faces parallel to VP and nearer to it is cut as shown in Fig. Draw the development of the retained portions of the prism which are shown in dark lines.

Solution



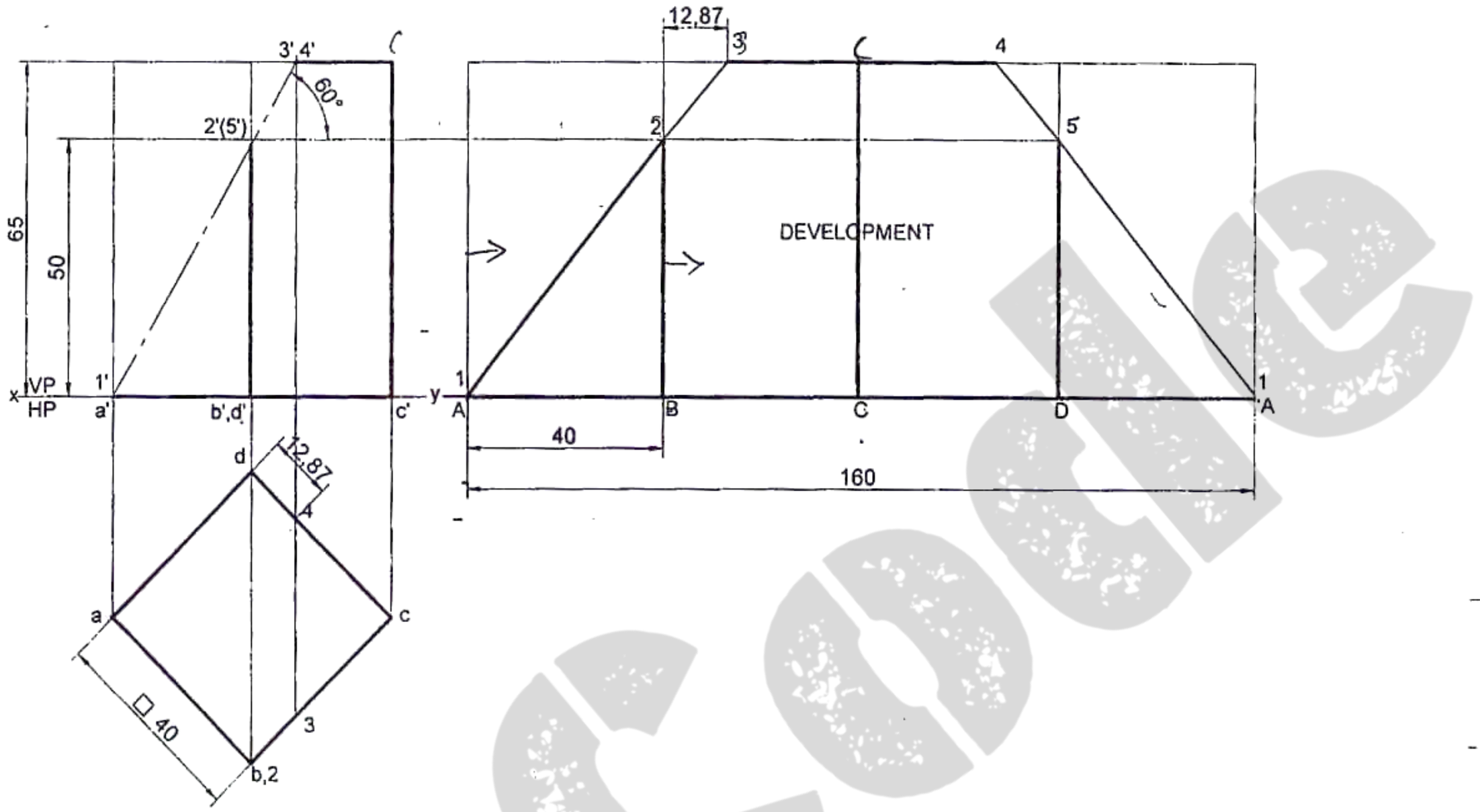
Problem 2 A square prism of base side 30 mm and axis length 60 mm is resting on HP on its base with all the vertical faces being equally inclined to VP. It is cut by an inclined plane 60° to HP and perpendicular to VP and is passing through a point on the axis at a distance 50 mm from the base. Draw the development of the lower portion of the prism.

Solution



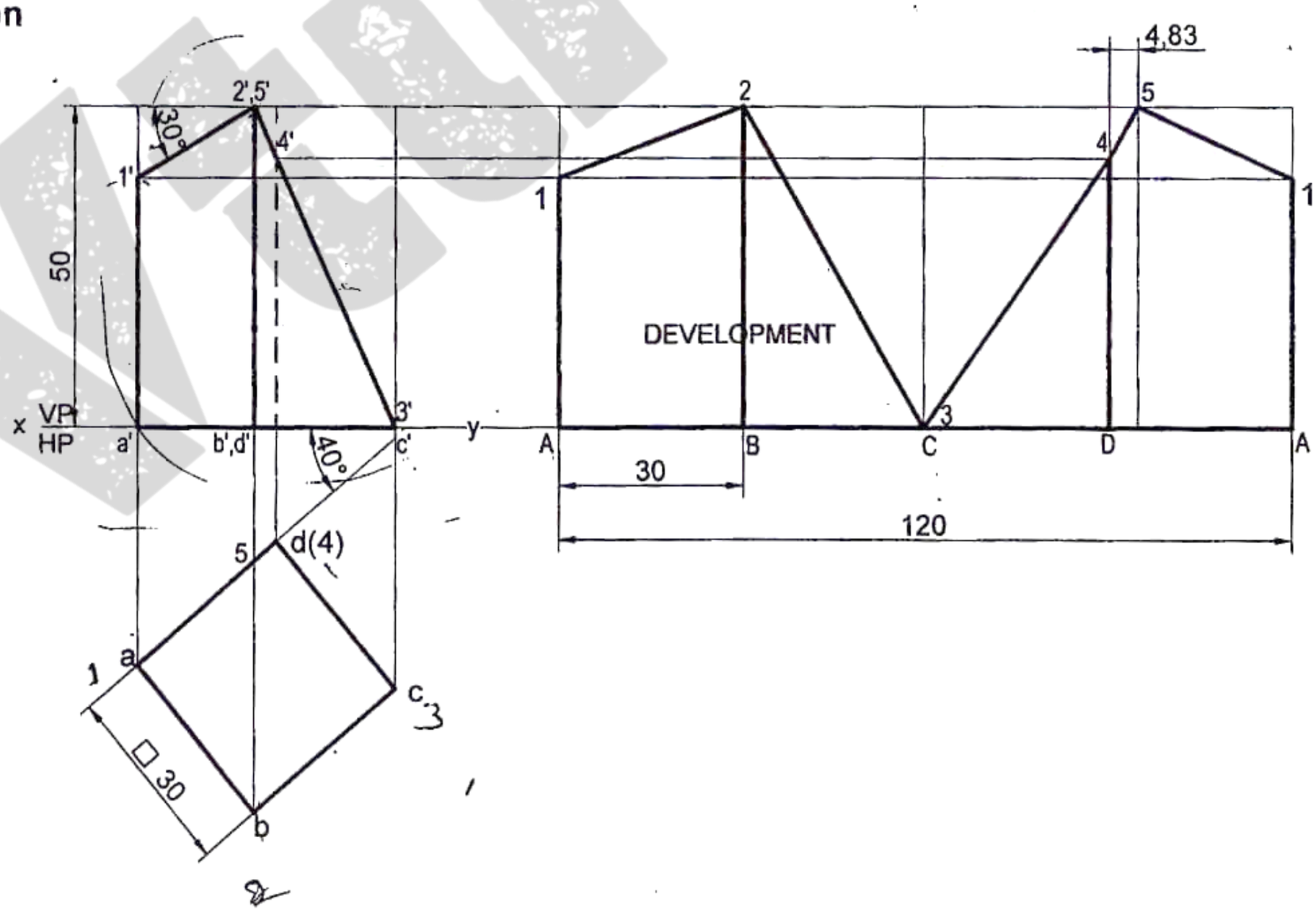
Problem 3 A square prism of base side 40mm and axis length 65mm is resting on HP on its base with all the vertical faces being equally inclined to VP. It is cut by an inclined plane 60° to HP and perpendicular to VP and is passing through a point on the axis at a distance 15mm from the top face. Draw the development of the lower portion of the prism.

Solution



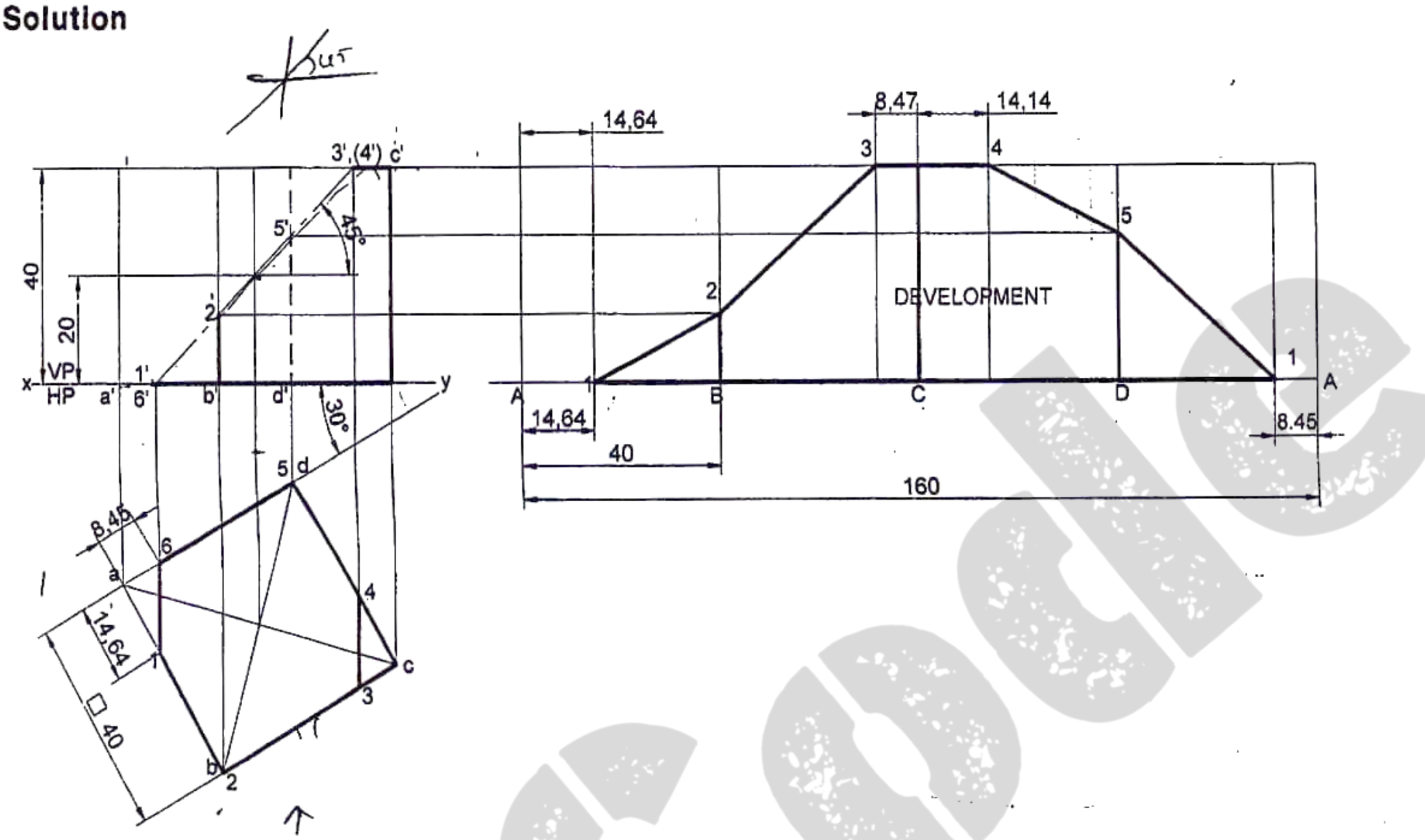
Problem 4 A square prism of 30mm side of the base and height 50mm is resting with its base on HP such that one of its vertical faces is inclined at 40° to VP. It is cut as shown in the following front view figure. Draw the development of the lateral surface of the prism.

Solution



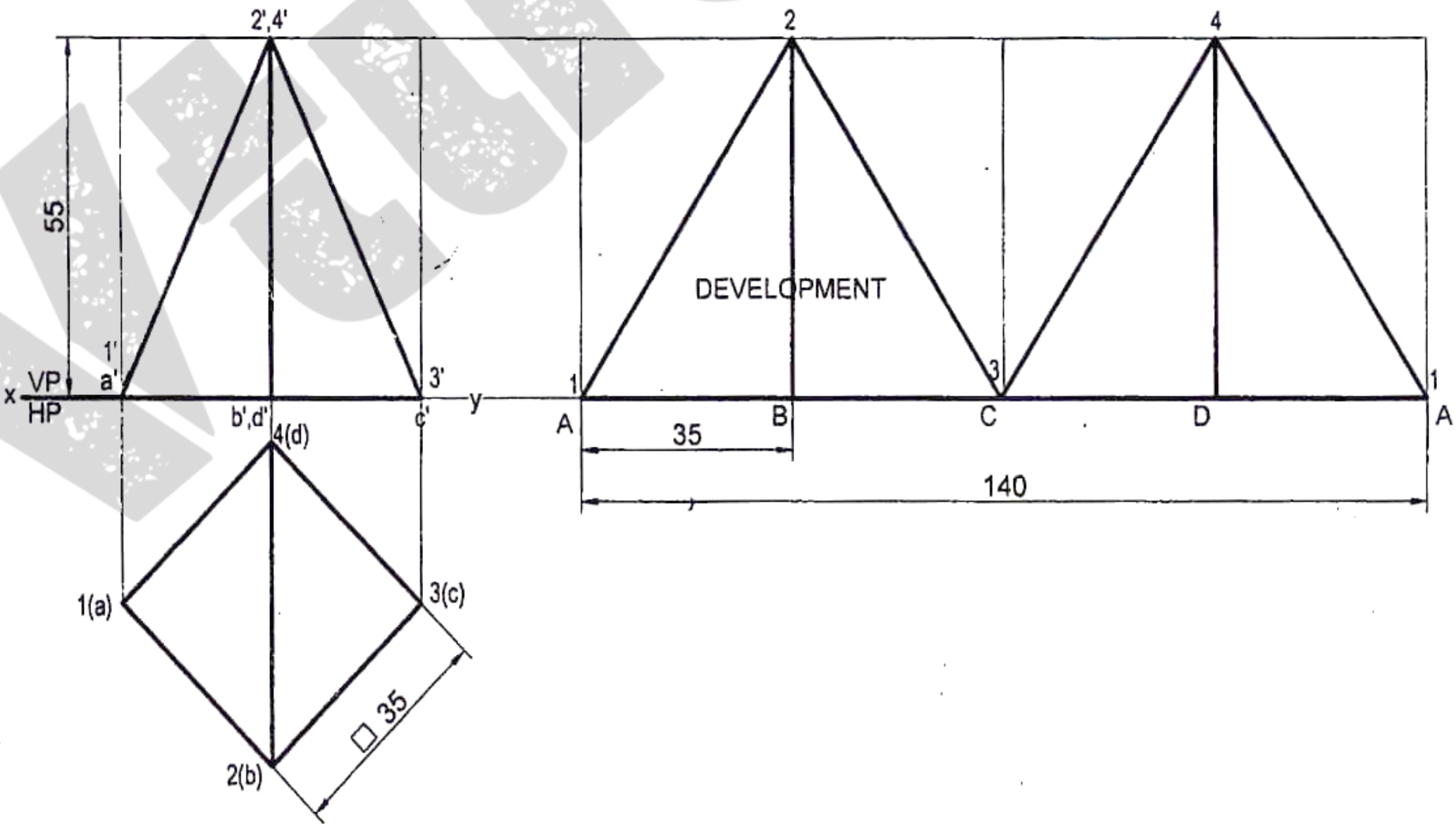
Problem 5 A cube of side 40mm is resting on HP with its base on HP such that one of its vertical faces is inclined at 30° to the VP. It is cut by a section plane perpendicular to VP, inclined to HP at an angle 45º and passes through the midpoint of the axis. Draw the development of the lower lateral surface of the cube.

Solution



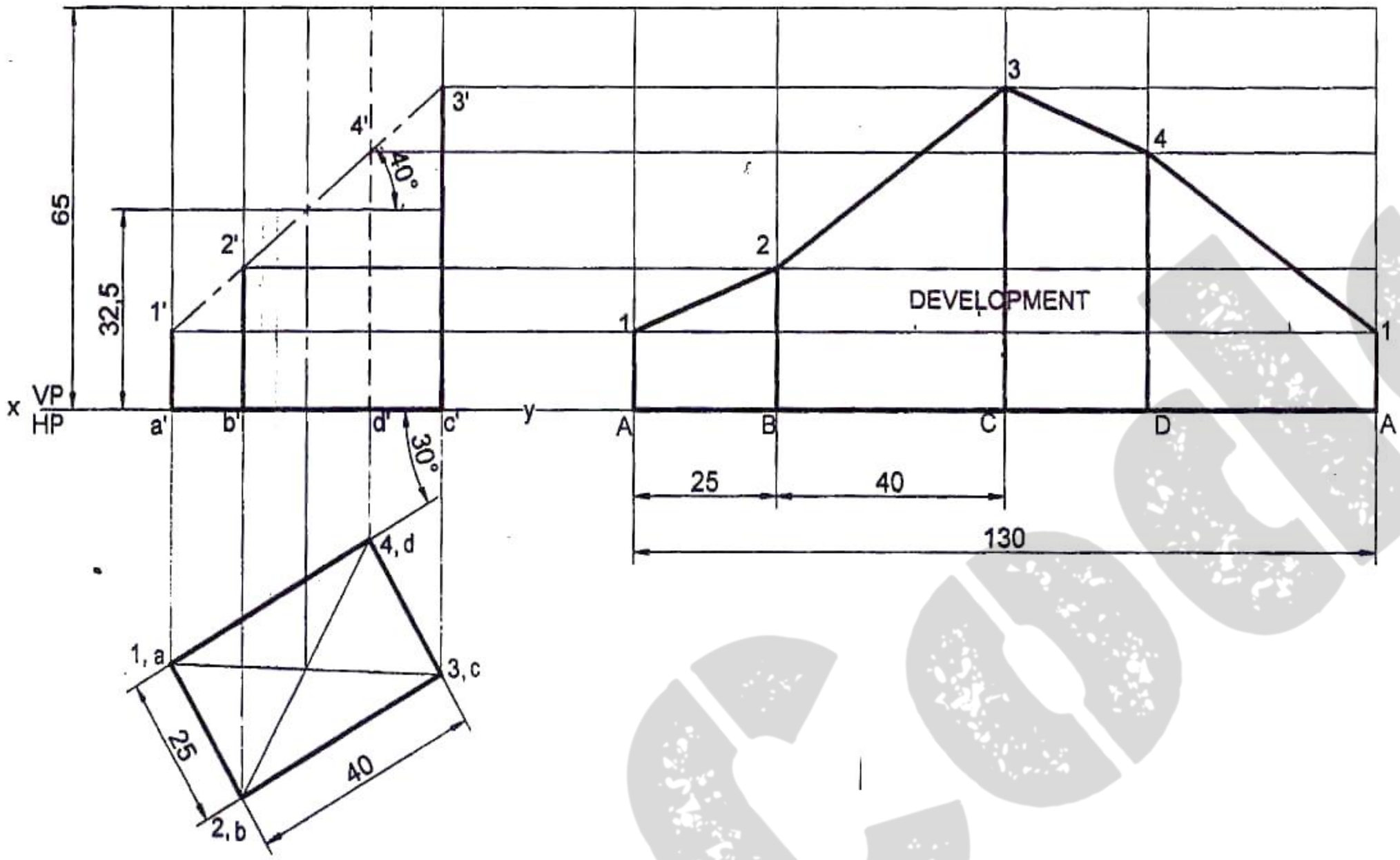
Problem 6 A square prism of base side 35mm rests with its base on HP and two faces equally inclined to VP. Draw the development of the lateral surfaces of the retained portions of the cut prism shown by dark lines in the Fig.

Solution



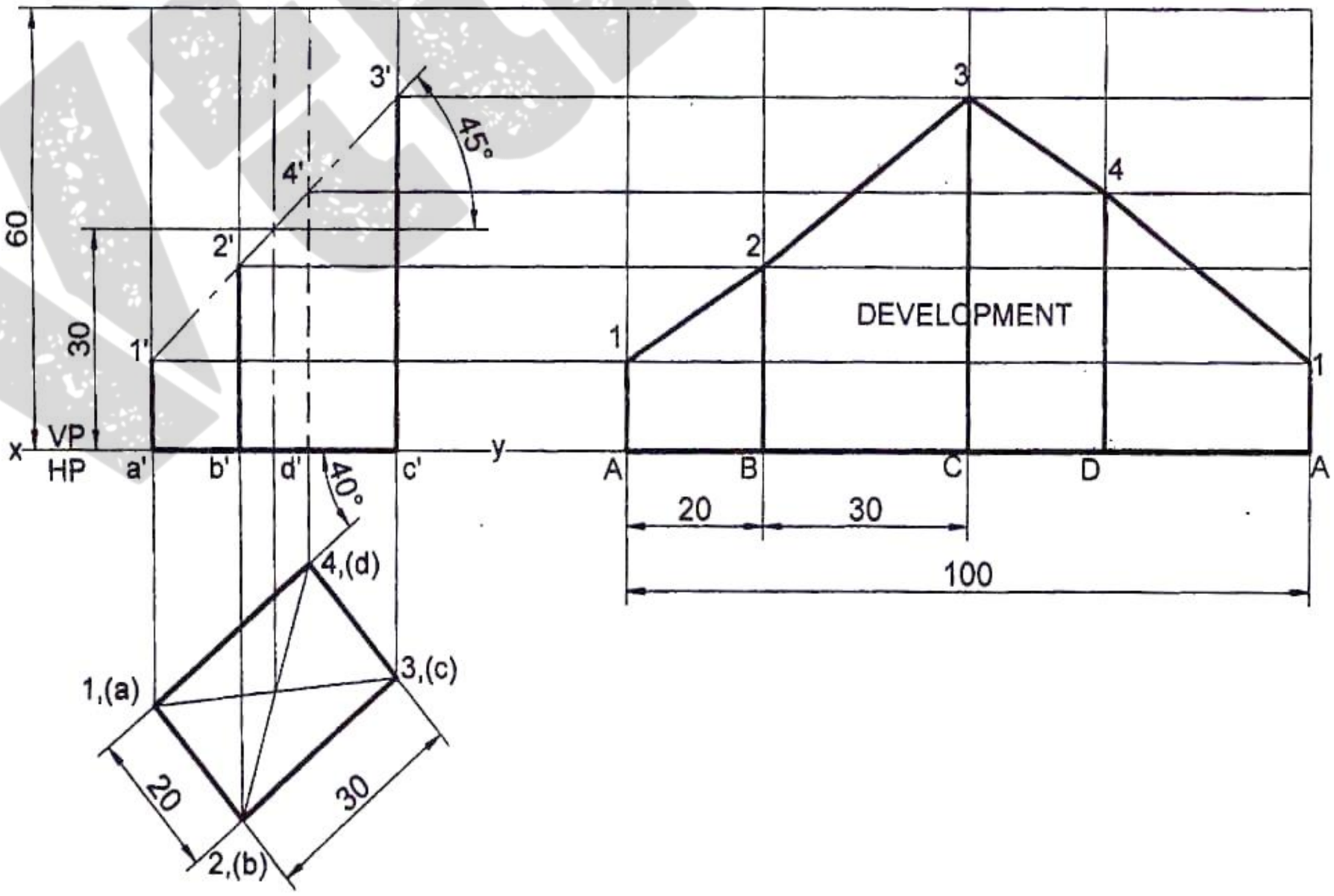
Problem 7 A rectangular prism of base 40mm x 25mm and height 65mm rests on HP on its base with the longer base side inclined at 30° to VP. It is cut by a plane inclined at 40° to HP, perpendicular to VP cuts the axis at its mid height. Draw the development of the remaining portion of the prism.

Solution



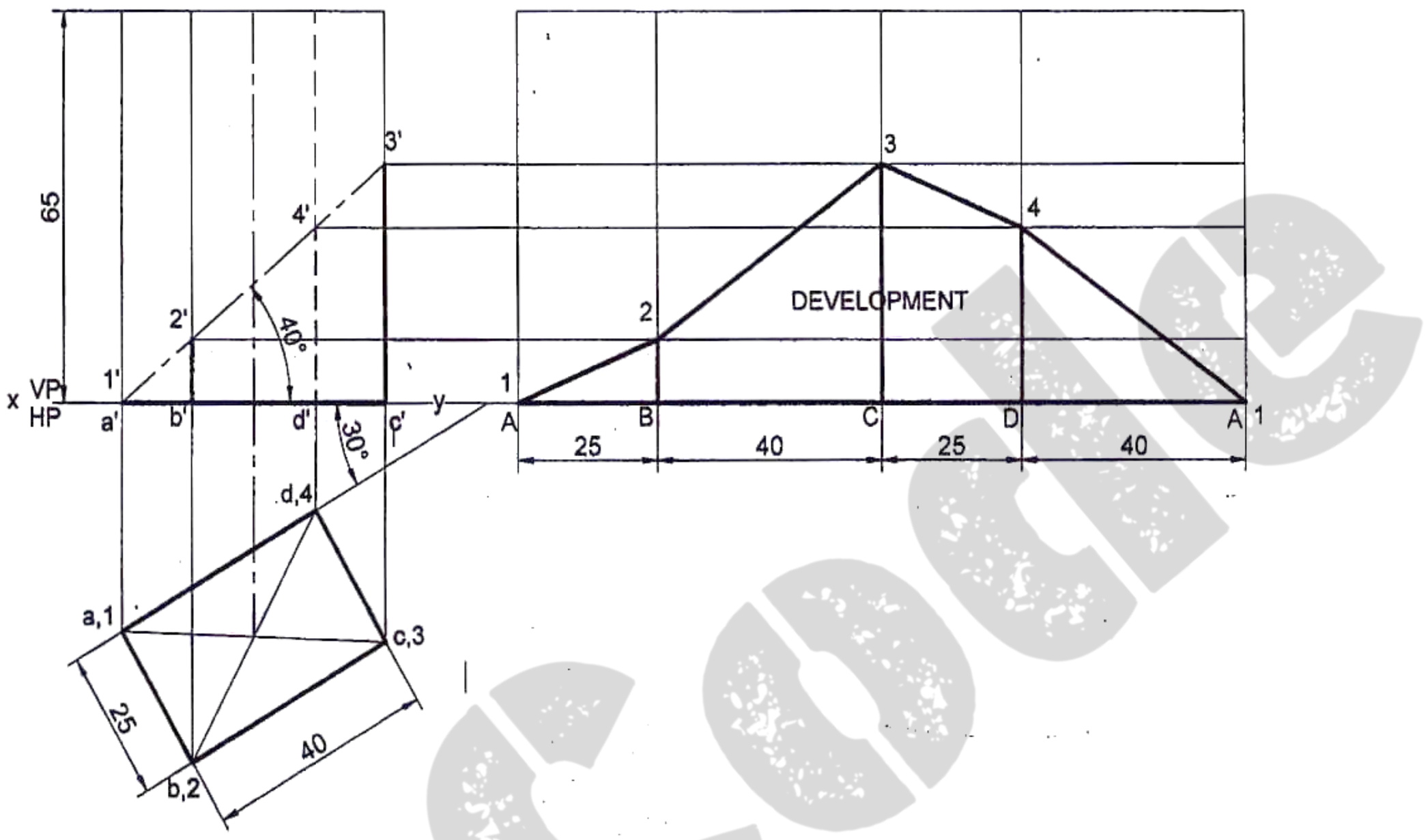
Problem 8 A rectangular prism of base 30mm x 20mm and height 60mm rests on HP on its base with the longer base side inclined at 40° to VP. It is cut by a plane inclined at 45° to HP, perpendicular to VP and bisects the axis. Draw the development of the lateral surface of the prism.

Solution



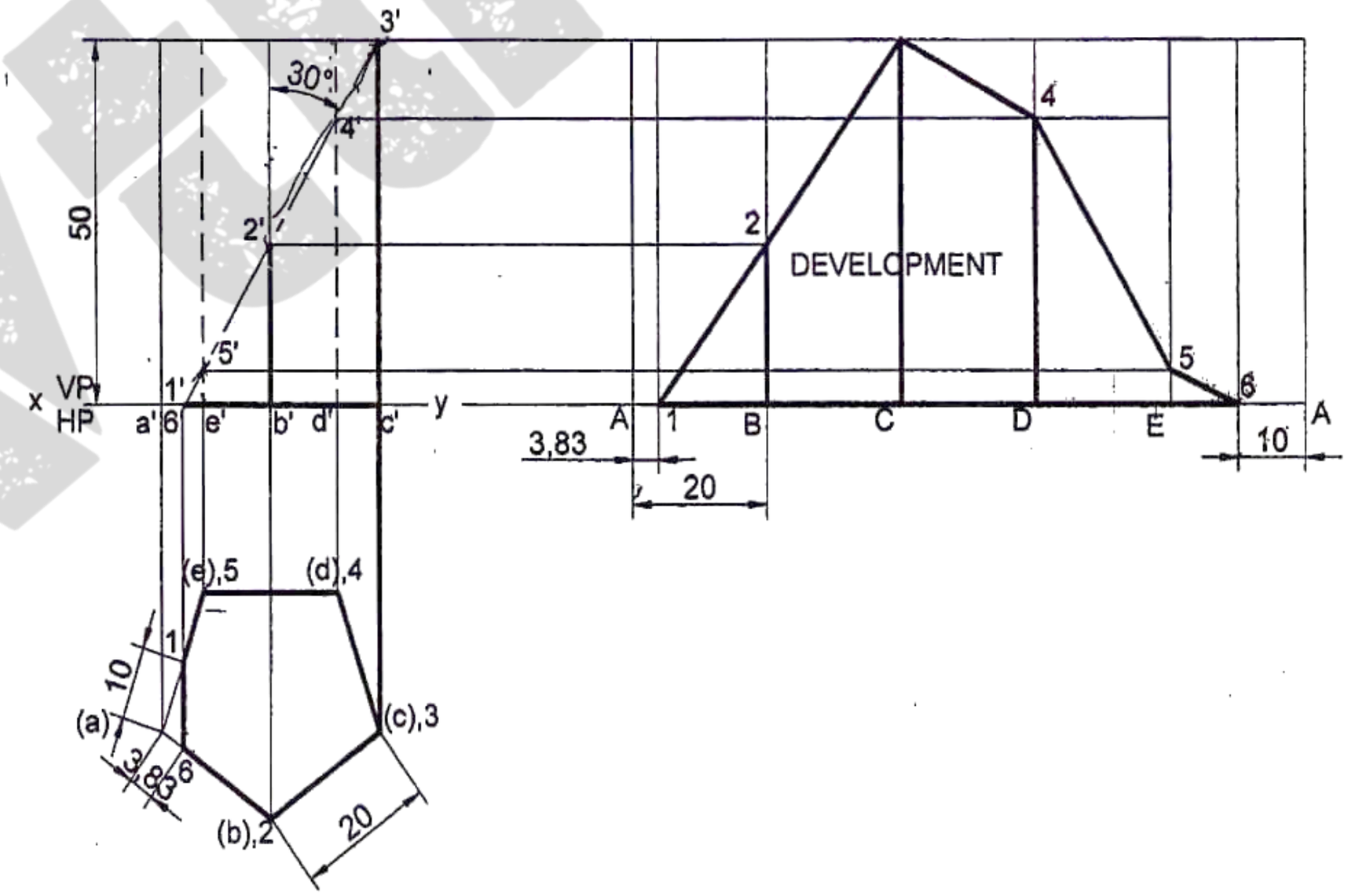
Problem 9 A rectangular prism of base size 25mm×40mm and axis length 65mm is resting on HP on its base with the longer side of base inclined at 30° to VP. It is cut by a plane inclined at 40° to HP and perpendicular to VP and passes through the extreme left corner of base. Draw the development of the lateral surface of the remaining portion of the prism.

Solution



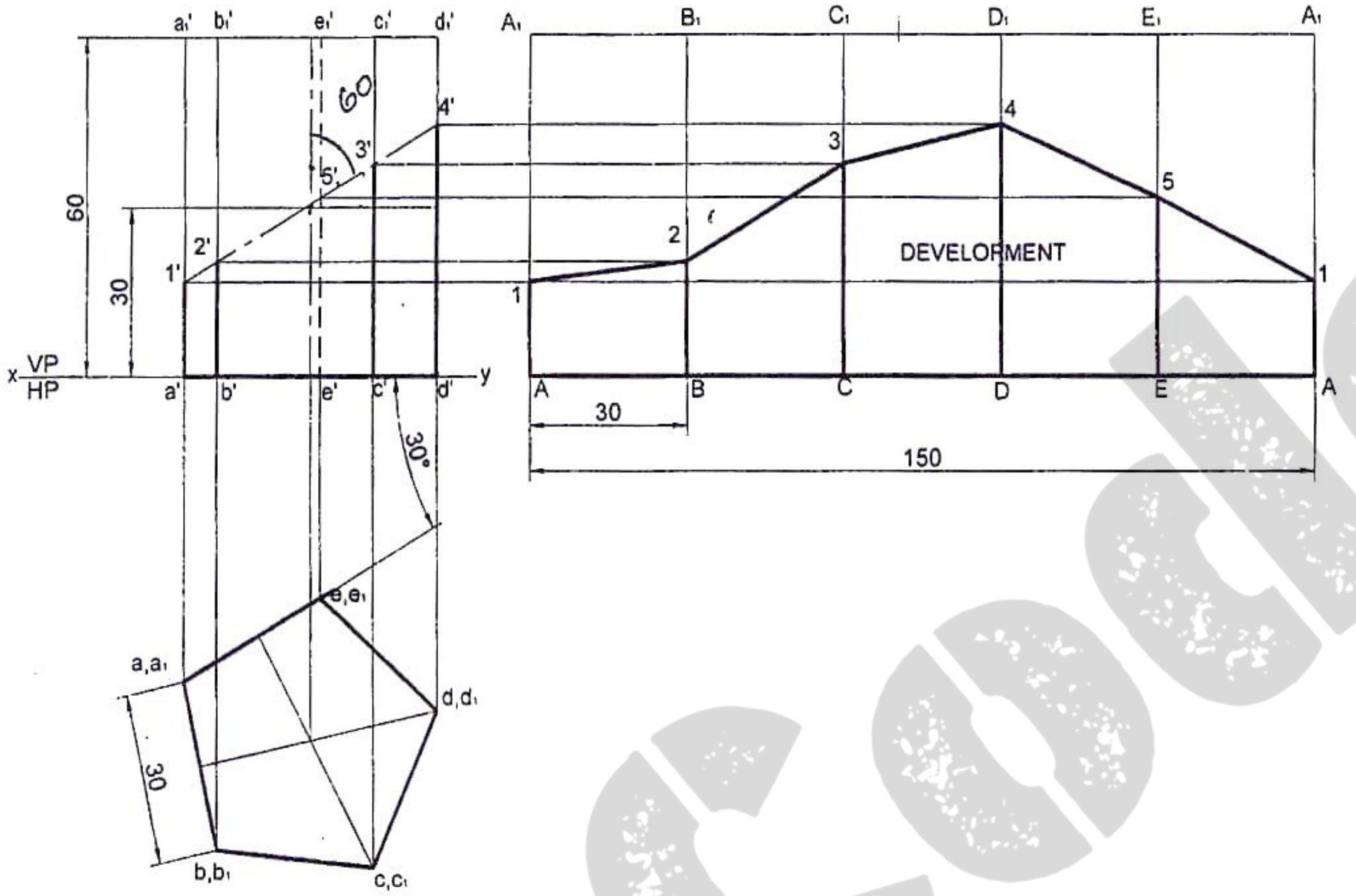
Problem 10 Draw the development of the truncated portion of the lateral faces of a pentagonal prism of 20mm sides of base and 50mm height standing vertically with one of its rectangular faces parallel to VP and nearer to it so as to produce a one piece development. The inclined face of the truncated prism is 30° to its axis and passes through the right extreme corner of the top face of the prism.

Solution



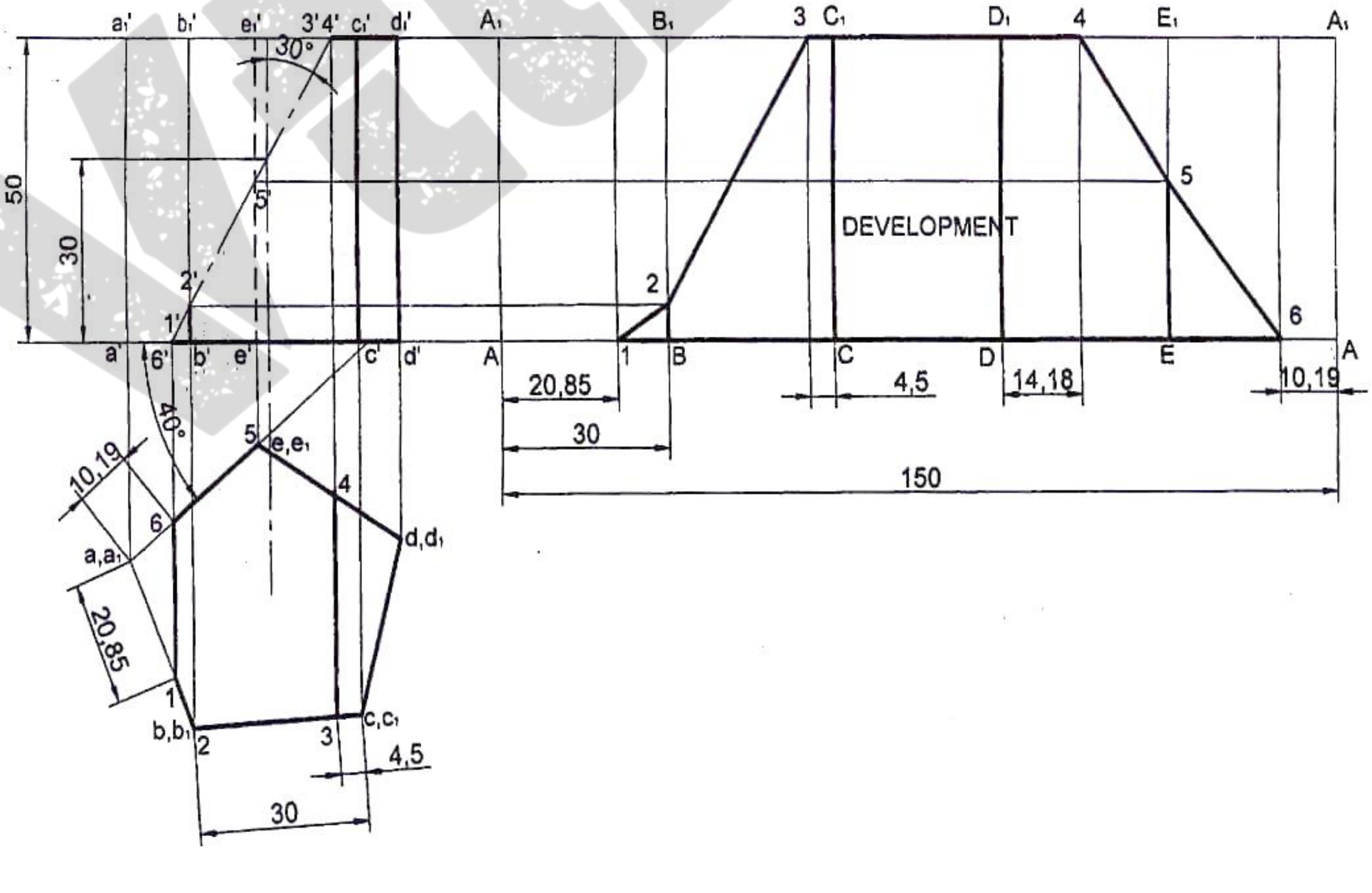
Problem 11 A regular pentagonal prism of height 60mm and base edge 30mm rests with its base on HP. The vertical face closest to VP is 30° to it. Draw the development of the truncated prism with its truncated surface inclined at 60° to its axis and bisecting it.

Solution



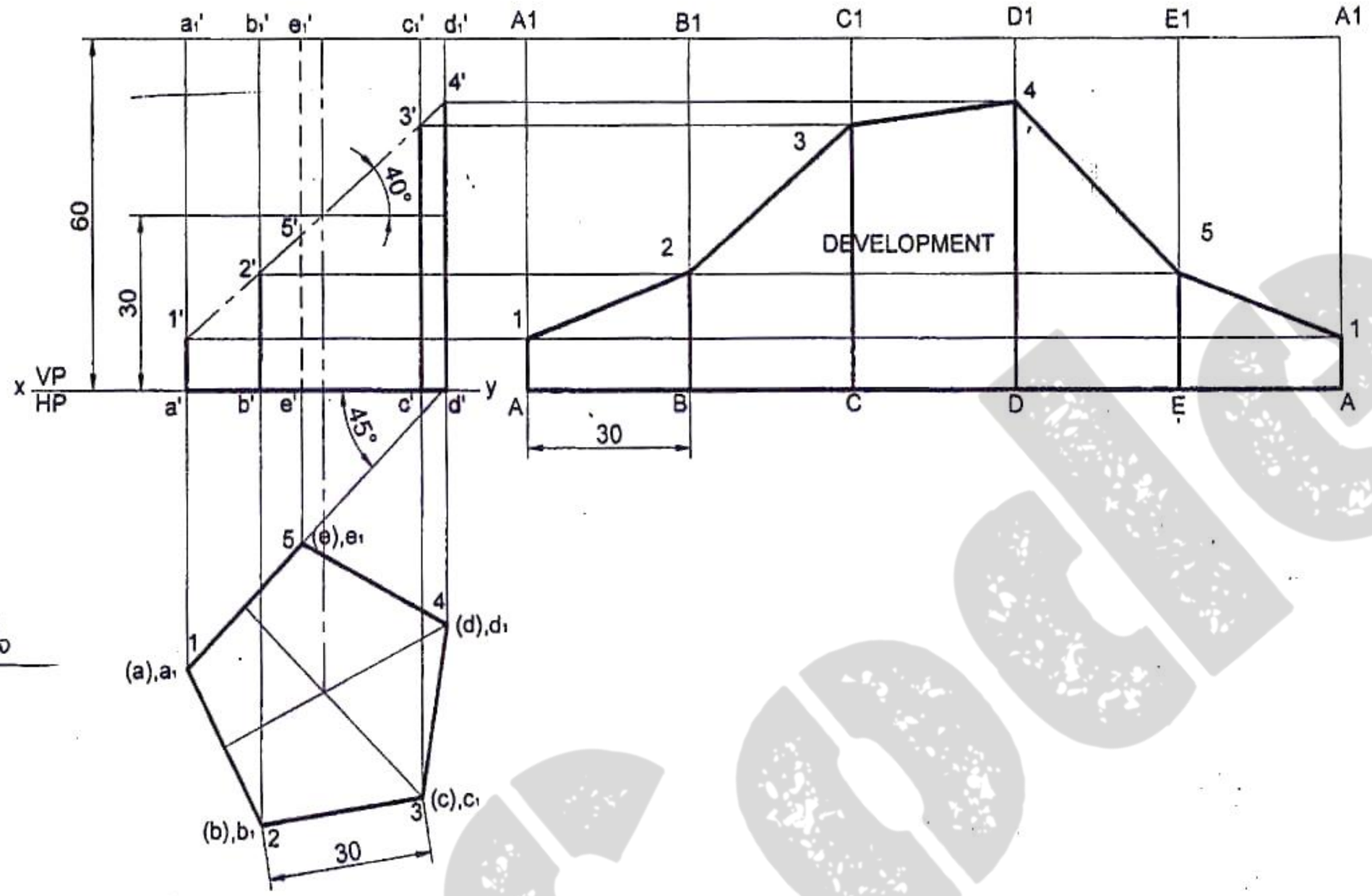
Problem 12 A pentagonal prism of 30mm side of base and height 50mm lies with its base on HP such that one of the rectangular faces is inclined at 40° to VP. It is cut to the shape of a truncated pyramid with the truncated surface inclined at 30° to the axis so as to pass through a point on it 30mm above the base. Develop the truncated portion of the prism so as to produce a one piece development.

Solution



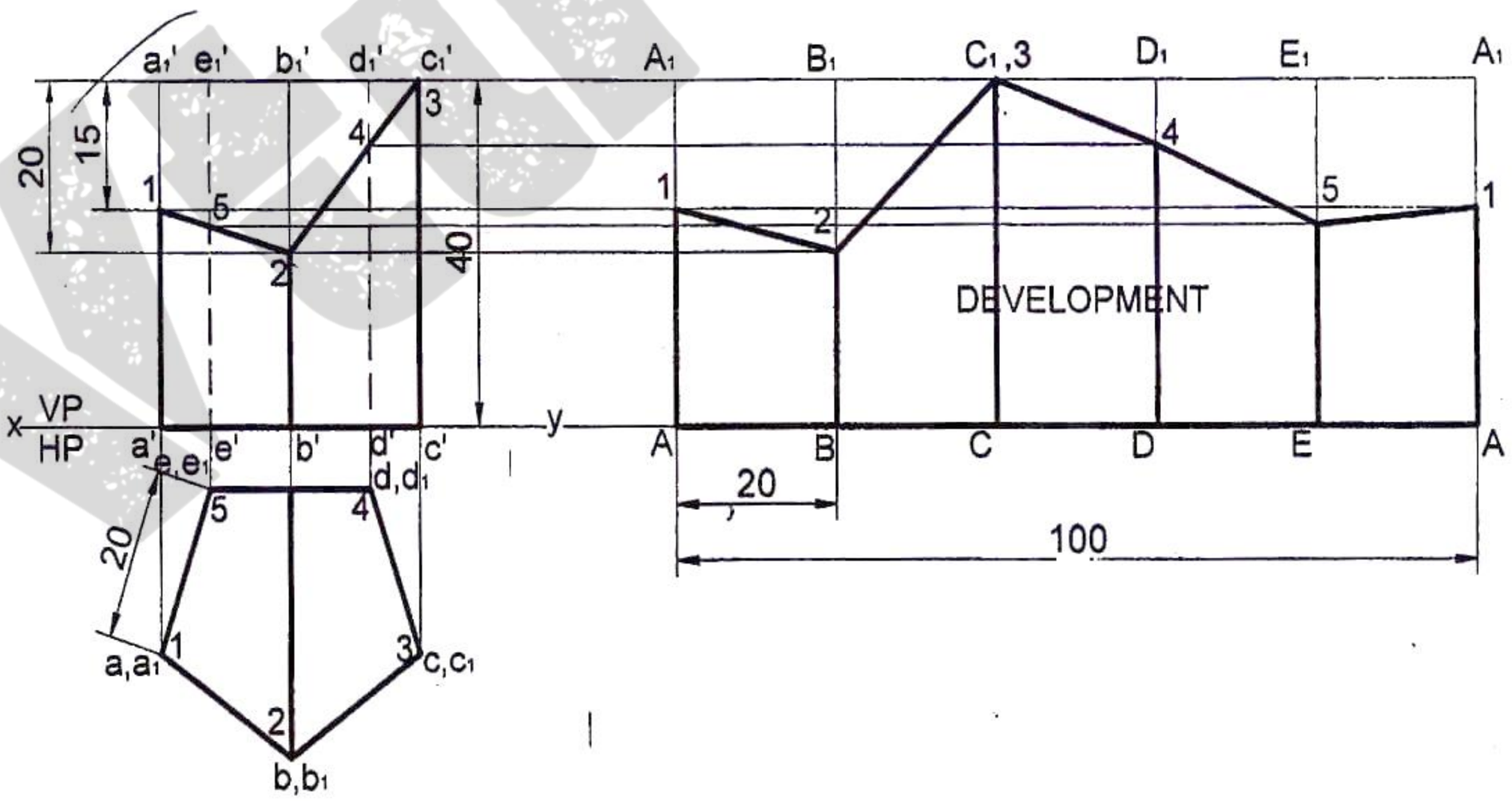
Problem 13 A pentagonal prism of base sides 30mm and axis length 60mm rests with its base on HP and an edge of the base inclined at 45° to VP. It is cut by a plane perpendicular to VP, inclined at 40° to HP and passing through a point on the axis, at a distance of 30 mm from the base. Develop the remaining surfaces of the truncated prism.

Solution



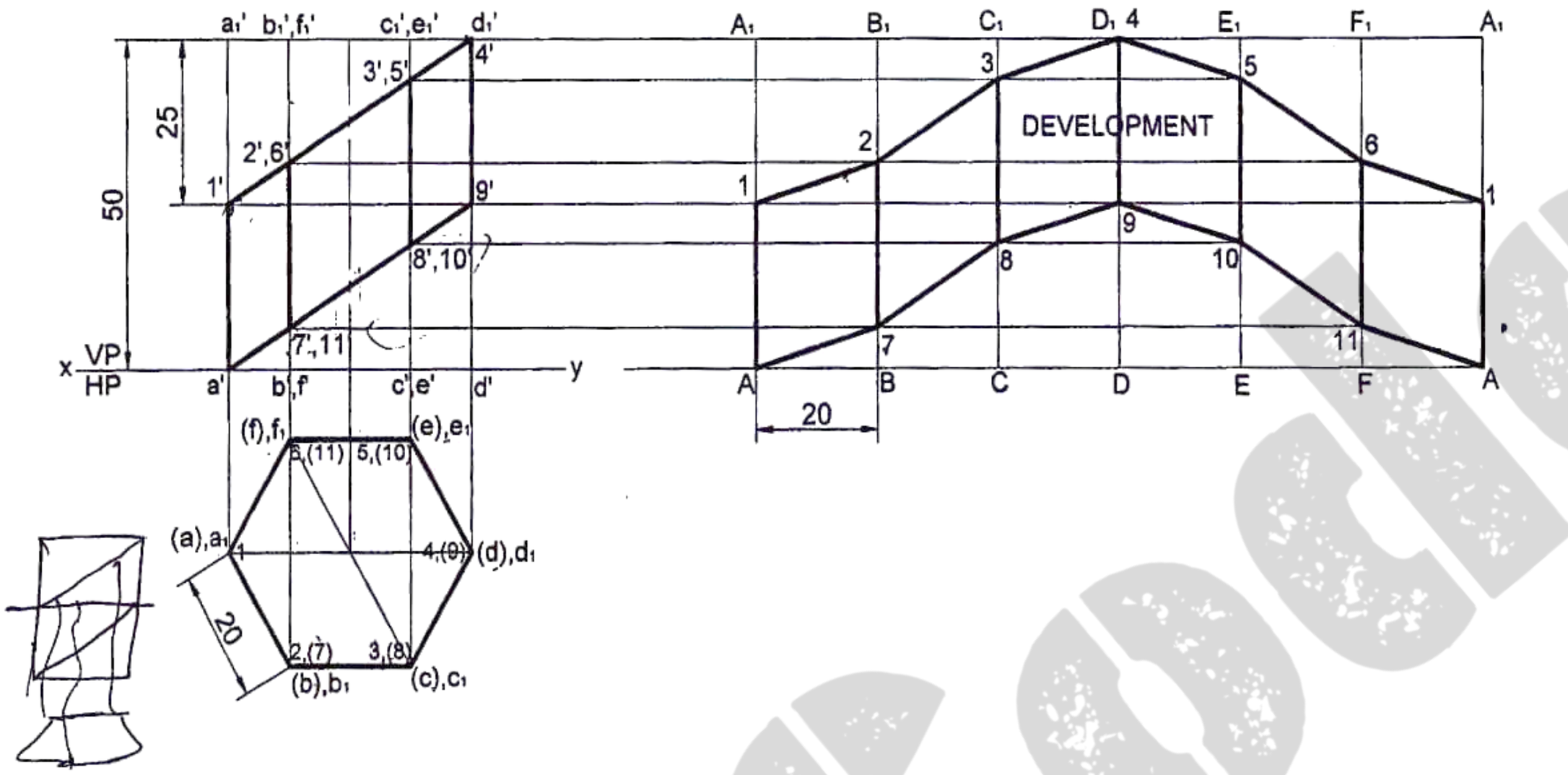
Problem 14 A pentagonal prism of base sides 20mm and height 40mm is resting with its base on HP and base edge parallel to the VP. The prism is cut as shown in the following front view. Draw the development of the lateral surface of the prism.

Solution



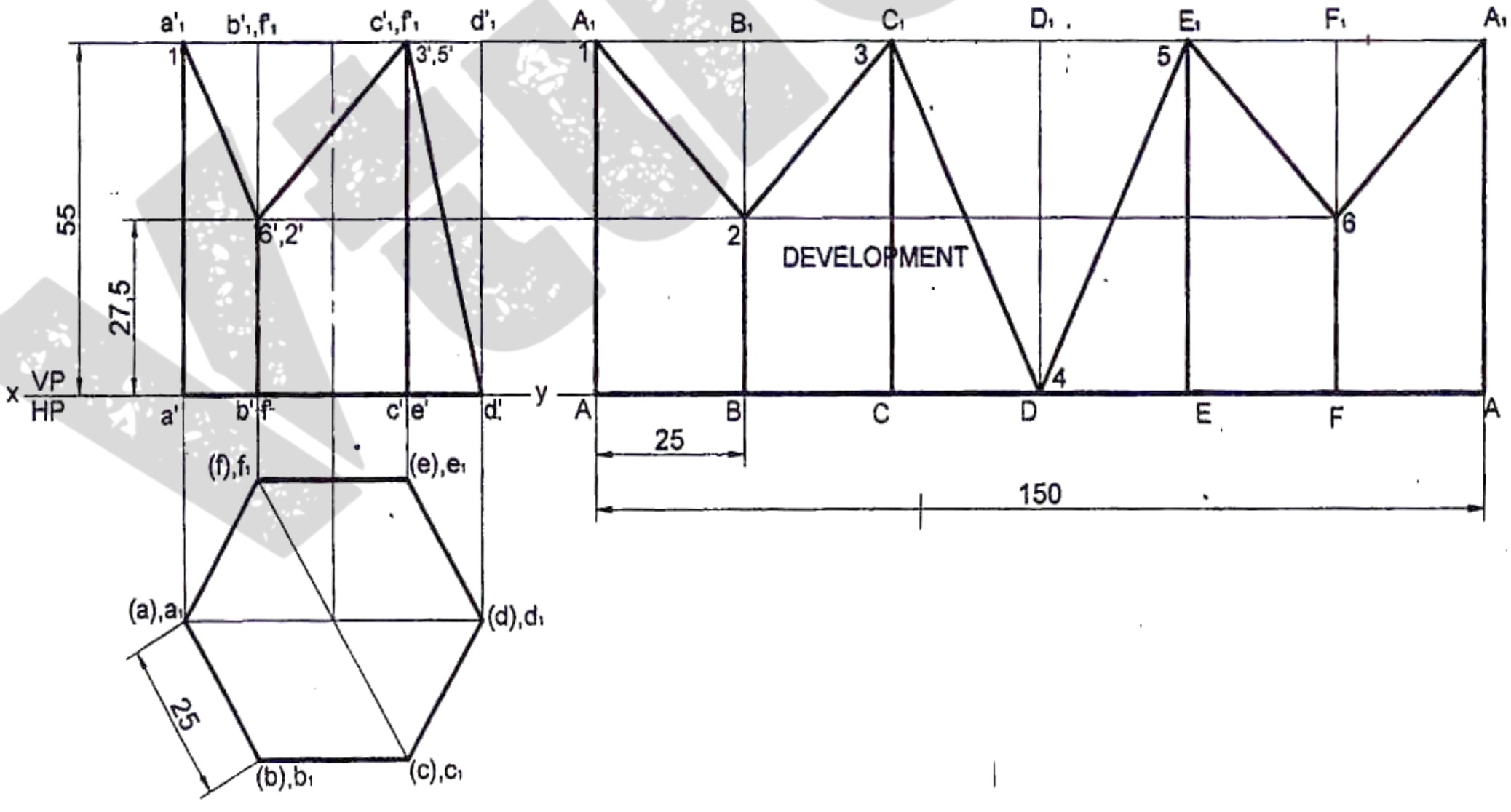
Problem 15 A hexagonal prism of base side 20mm and height 50mm is resting on HP on its base, such that one of its base edge is parallel to VP. The prism is cut in this position as shown in the following front view. Draw the development of the lateral surface of the prism.

Solution



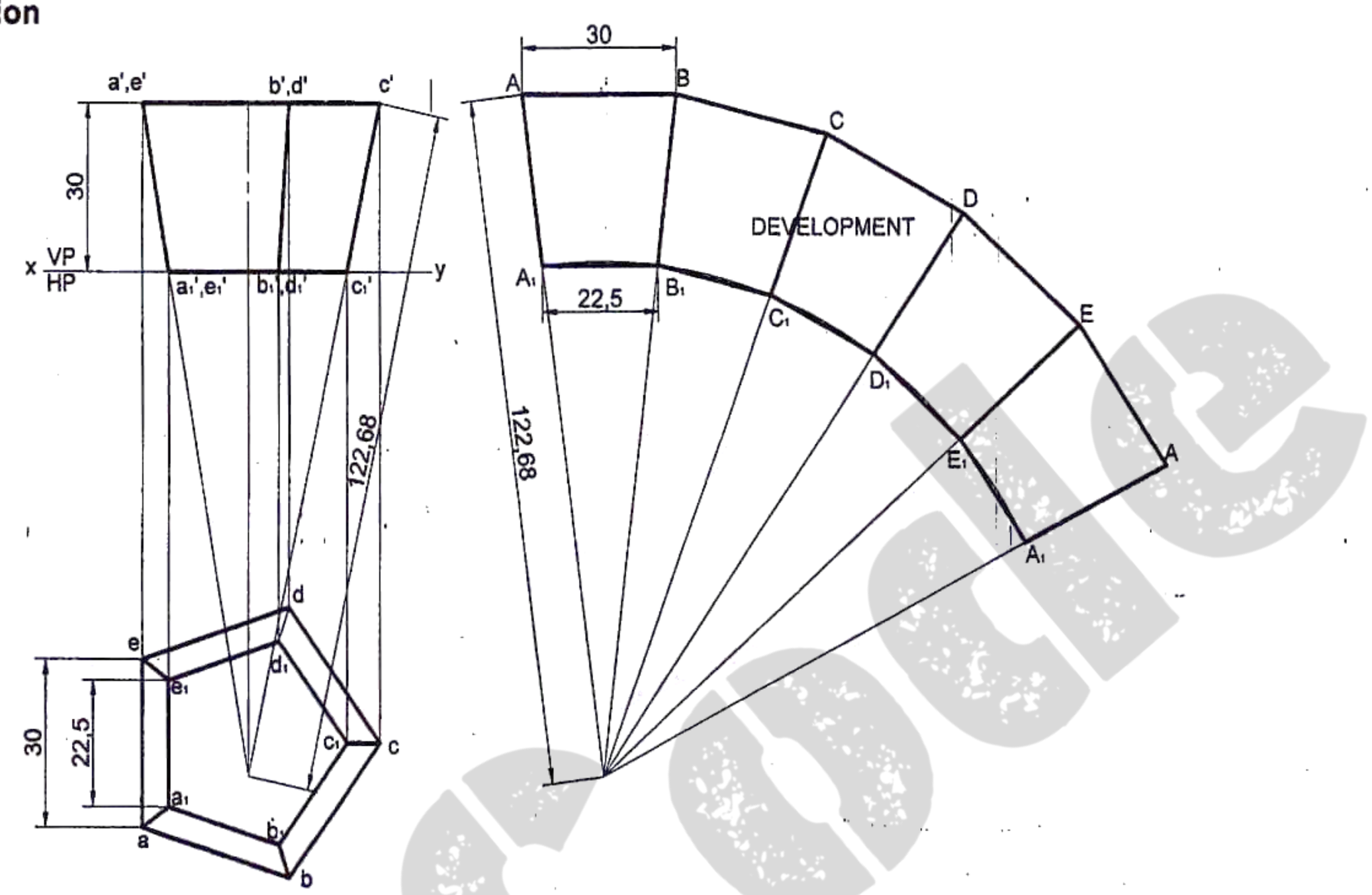
Problem 16 A hexagonal prism of base side 25mm and height 55mm is resting on HP on its base, such that one of its base edges is parallel to VP. The prism is cut in this position as shown in the following front view. Draw the development of the lateral surface of the prism.

Solution



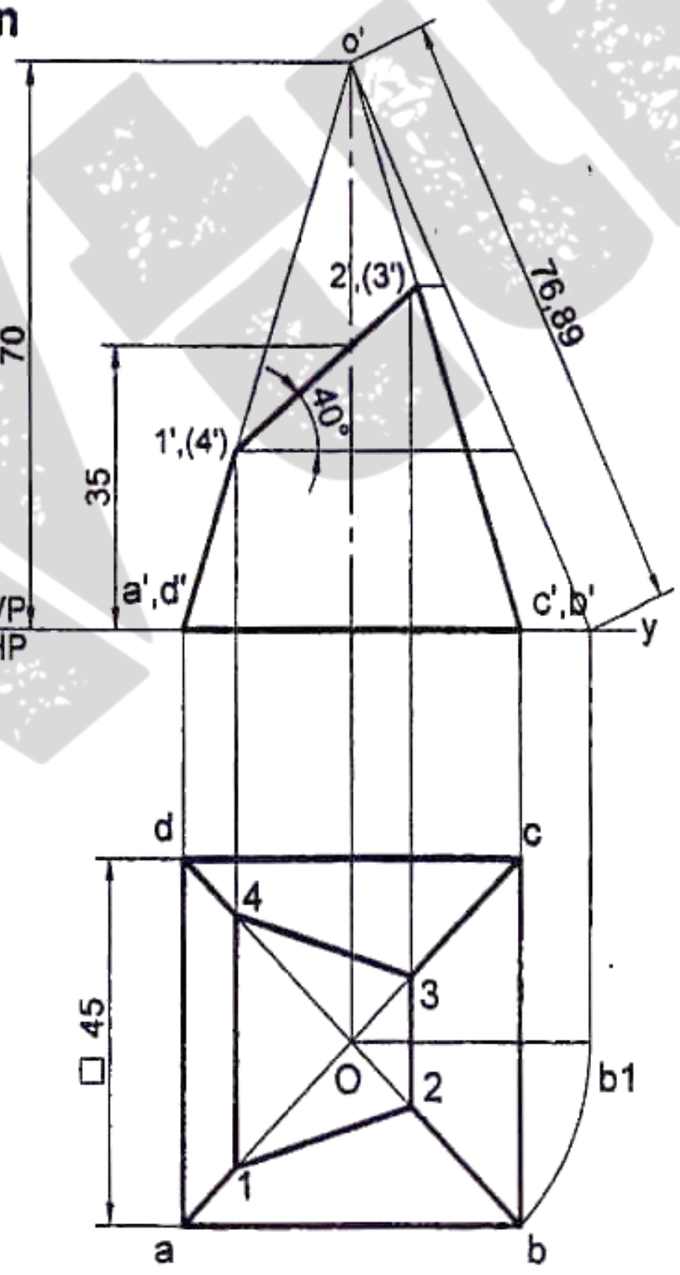
Problem 17 The inside of a hopper of a flour mill is to be lined with thin sheet. The top and bottom of the hopper are regular pentagons with each side equal to 30 mm and 22.5mm respectively. The height of the hopper is 30mm. Draw the shape of the sheet to which it is to be cut so as to fit into the hopper.

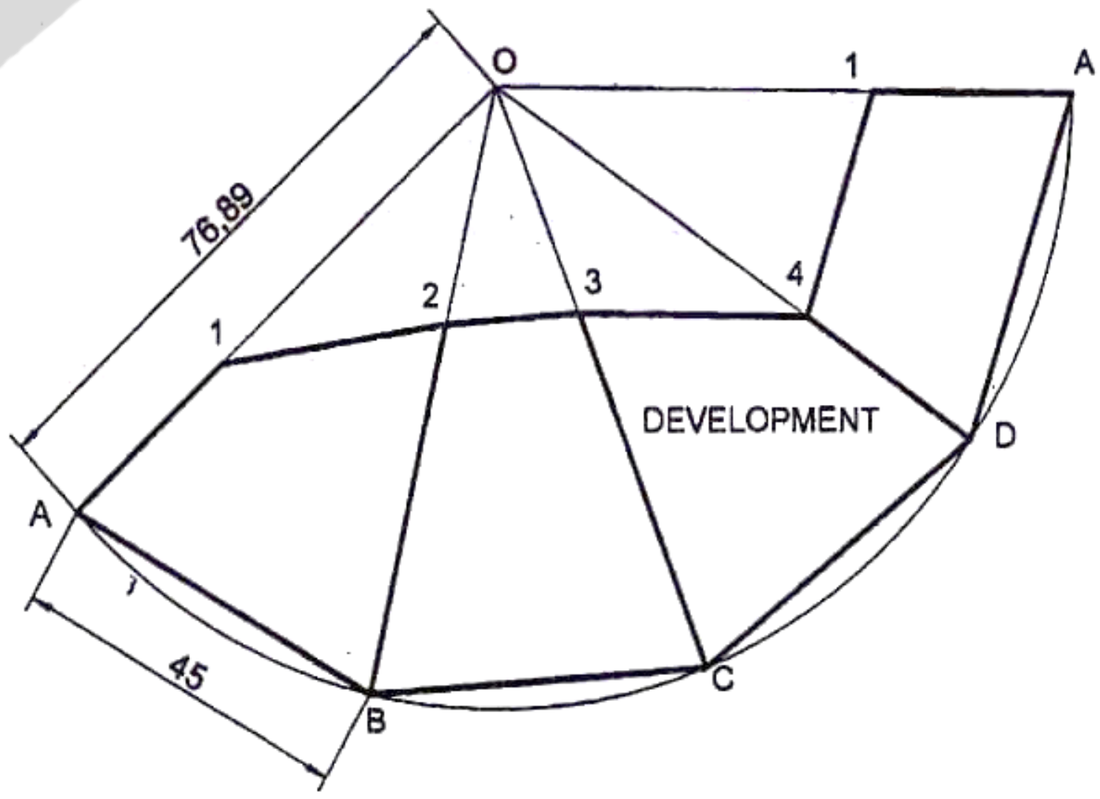
Solution



Problem 18 A square pyramid of side of base 45mm, altitude 70mm is resting with its base on HP with two sides of the base parallel to VP. The pyramid is cut by a section plane which is perpendicular to the VP and inclined at 40° to the HP. The cutting plane bisects the axis of the pyramid. Obtain the development of the lateral surfaces the truncated pyramid.

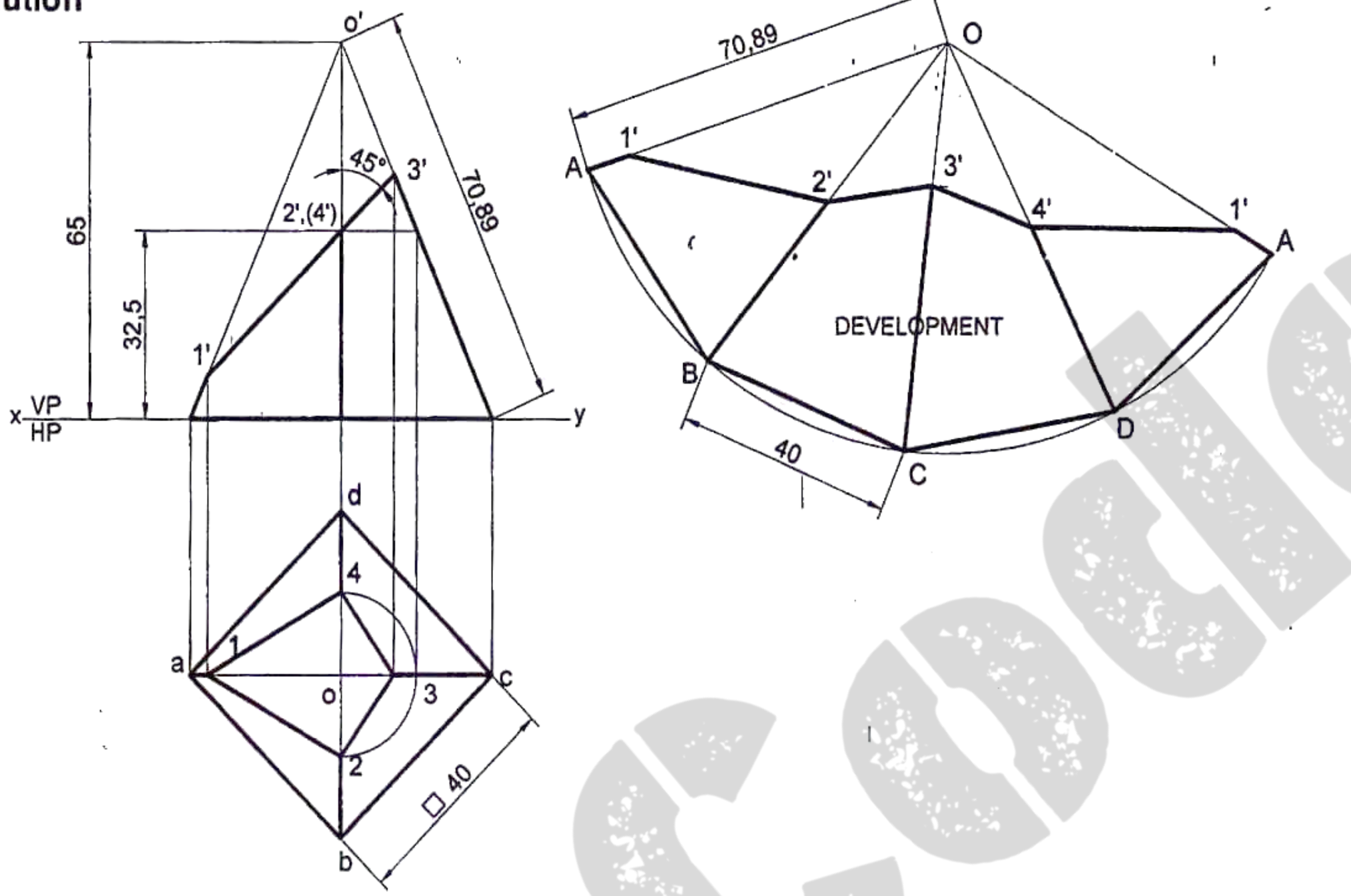
Solution





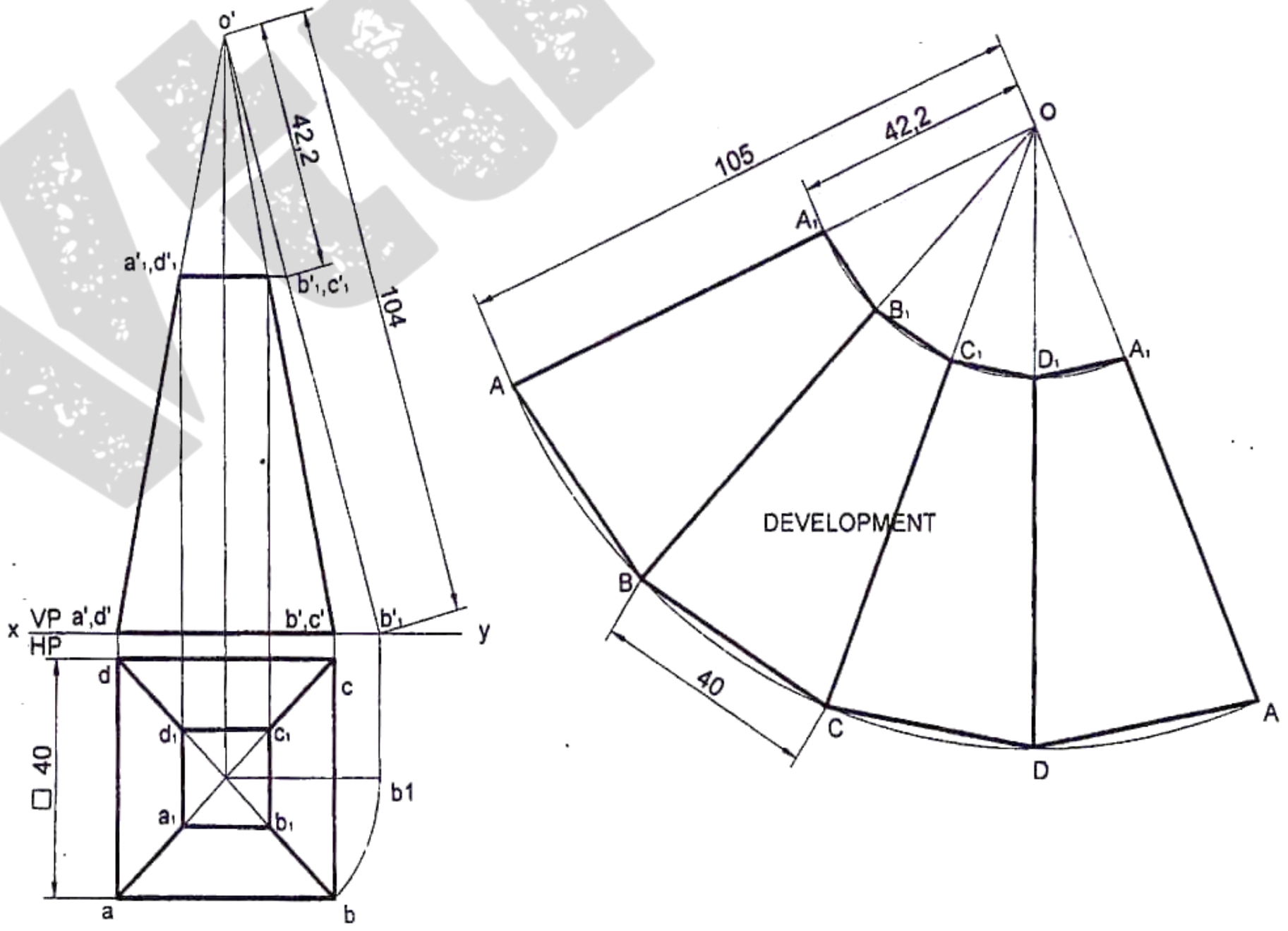
Problem 19 A square pyramid base 40mm side and axis 65mm long has its base on HP and all the edges of the base are equally inclined to VP. It is cut to with an inclined section plane so as the truncated surface at 45° to its axis, bisecting it. Draw the development of the truncated pyramid.

Solution



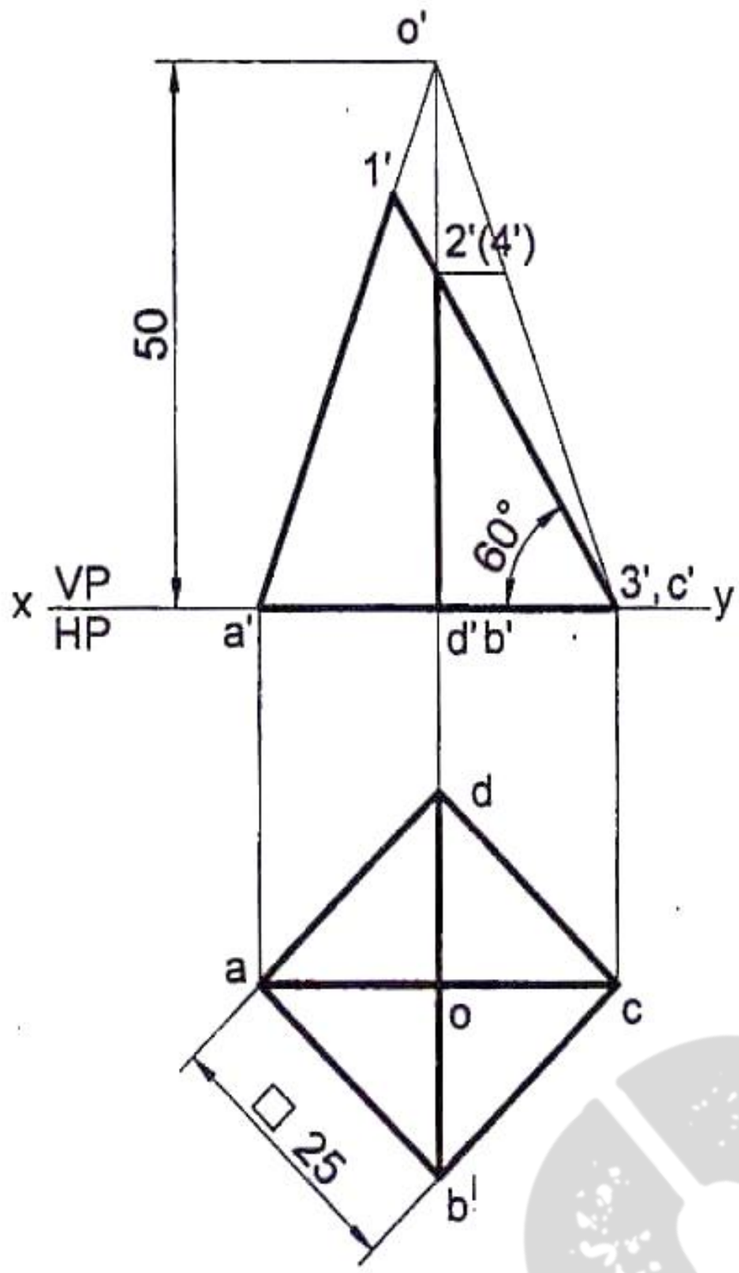
Problem 20 A frustum of a square pyramid has its base 40 mm sides, top 16 mm sides and height 60mm, its axis is vertical and a side of its base is parallel to VP. Draw the projections of the frustum and show the development of the lateral surfaces of it.

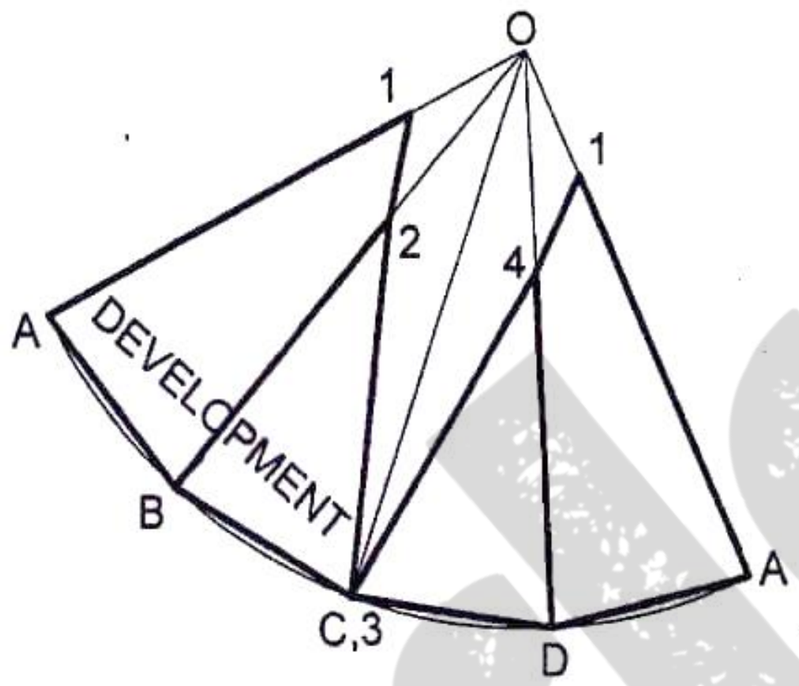
Solution



Problem 21 A square pyramid of 25mm base edge and 50mm height rests with its base on HP with all of its base edges equally inclined to VP. It is cut by a plane perpendicular to VP and inclined to HP at 60°, passing through the extreme right corner of base. Draw the development of the lateral surface of the pyramid.

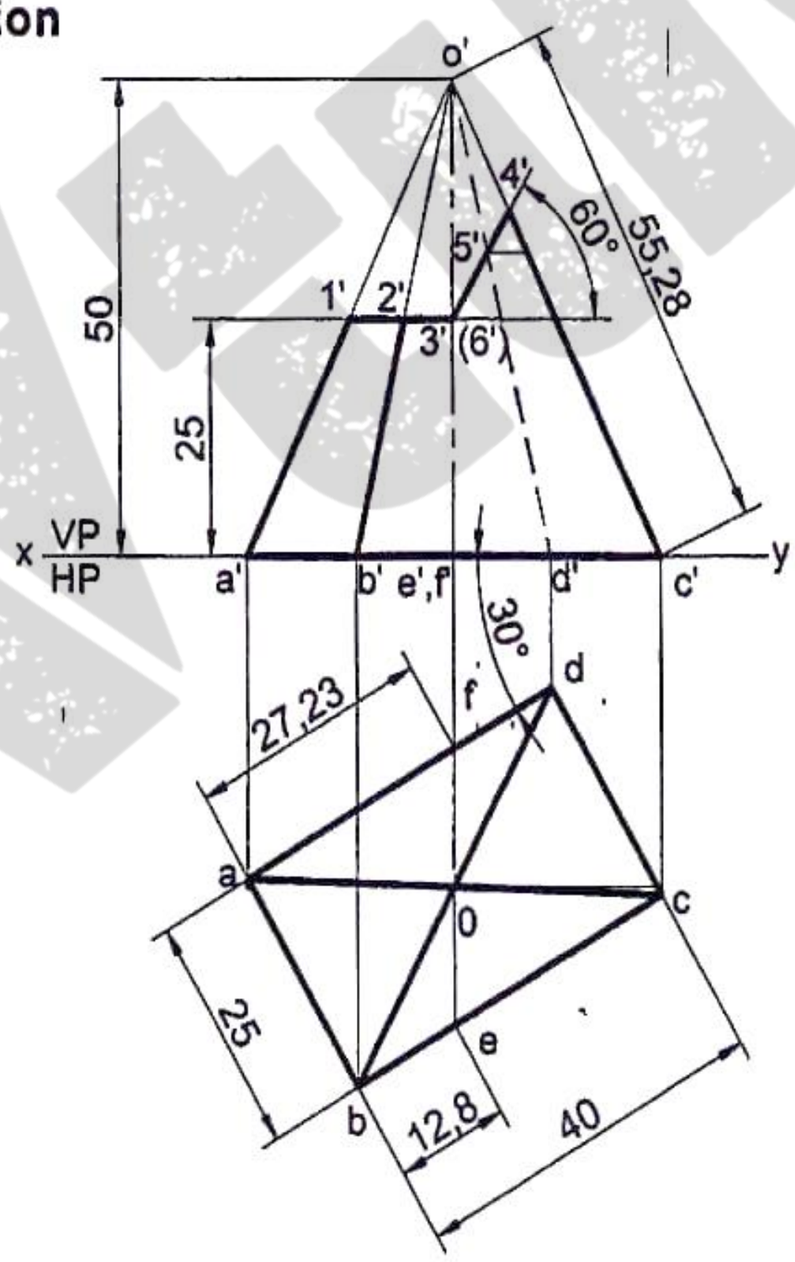
Solution

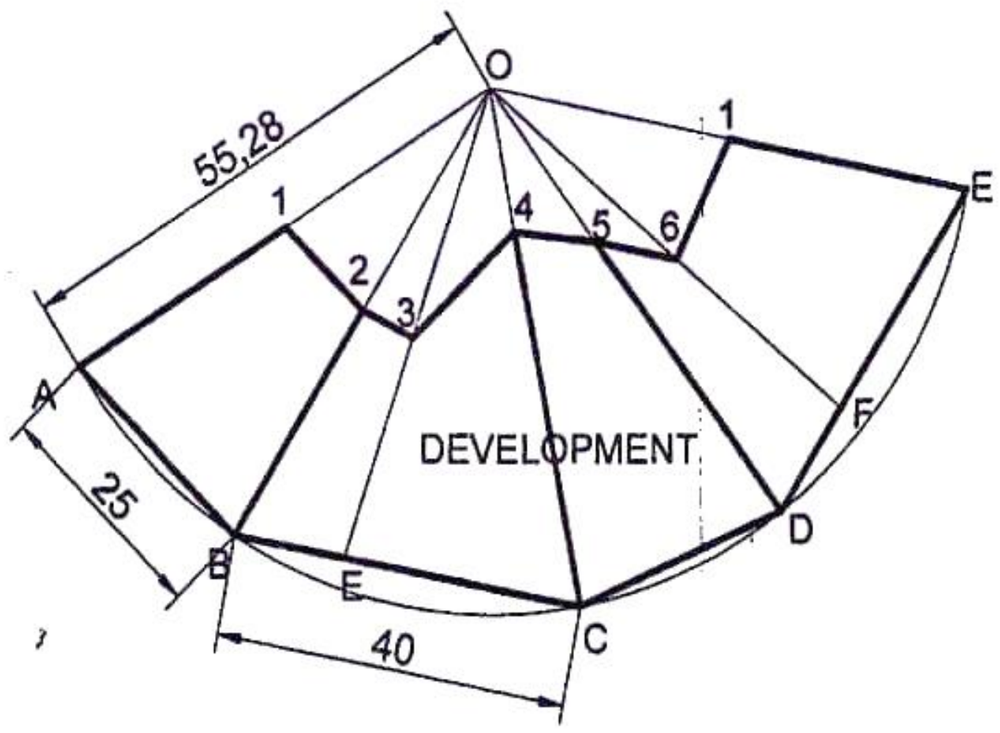




Problem 22 A rectangular pyramid, side of base 25mm x 40mm and height 50mm has one of the sides of the base is inclined at 30º to the VP. Draw the development of the lateral surface of the cut pyramid, whose front view is shown below.

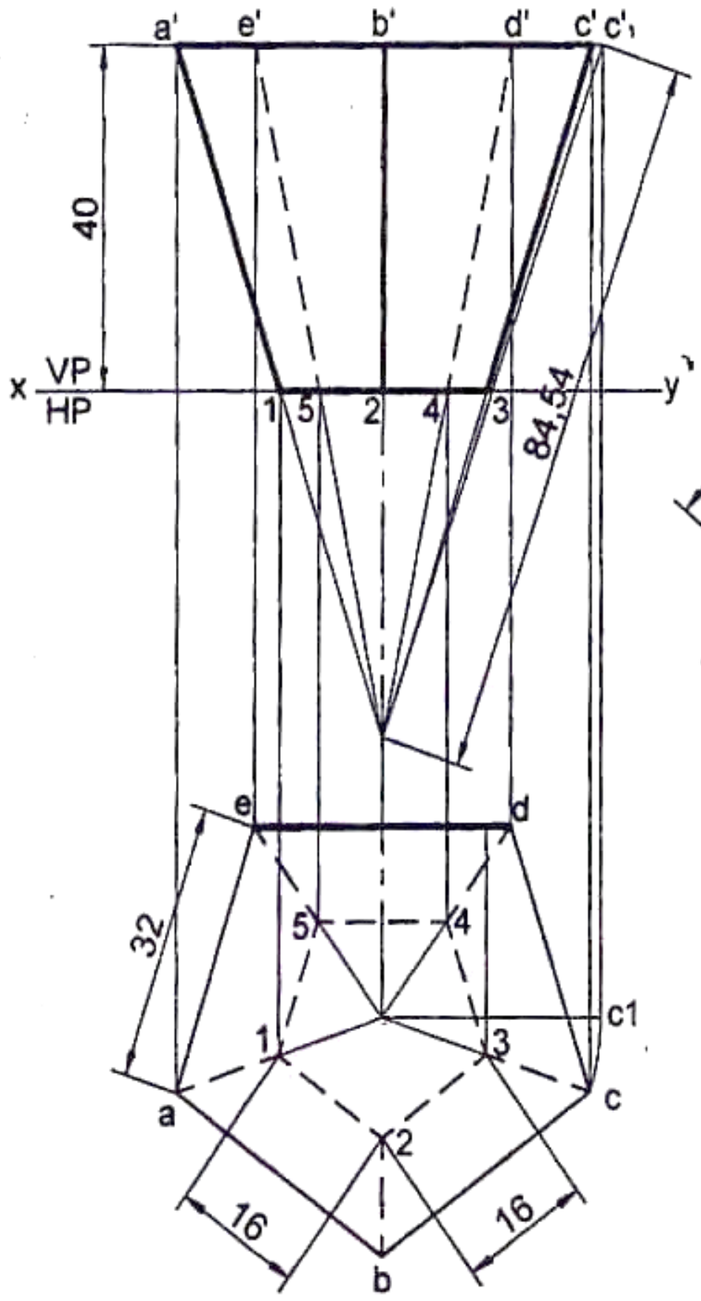
Solution

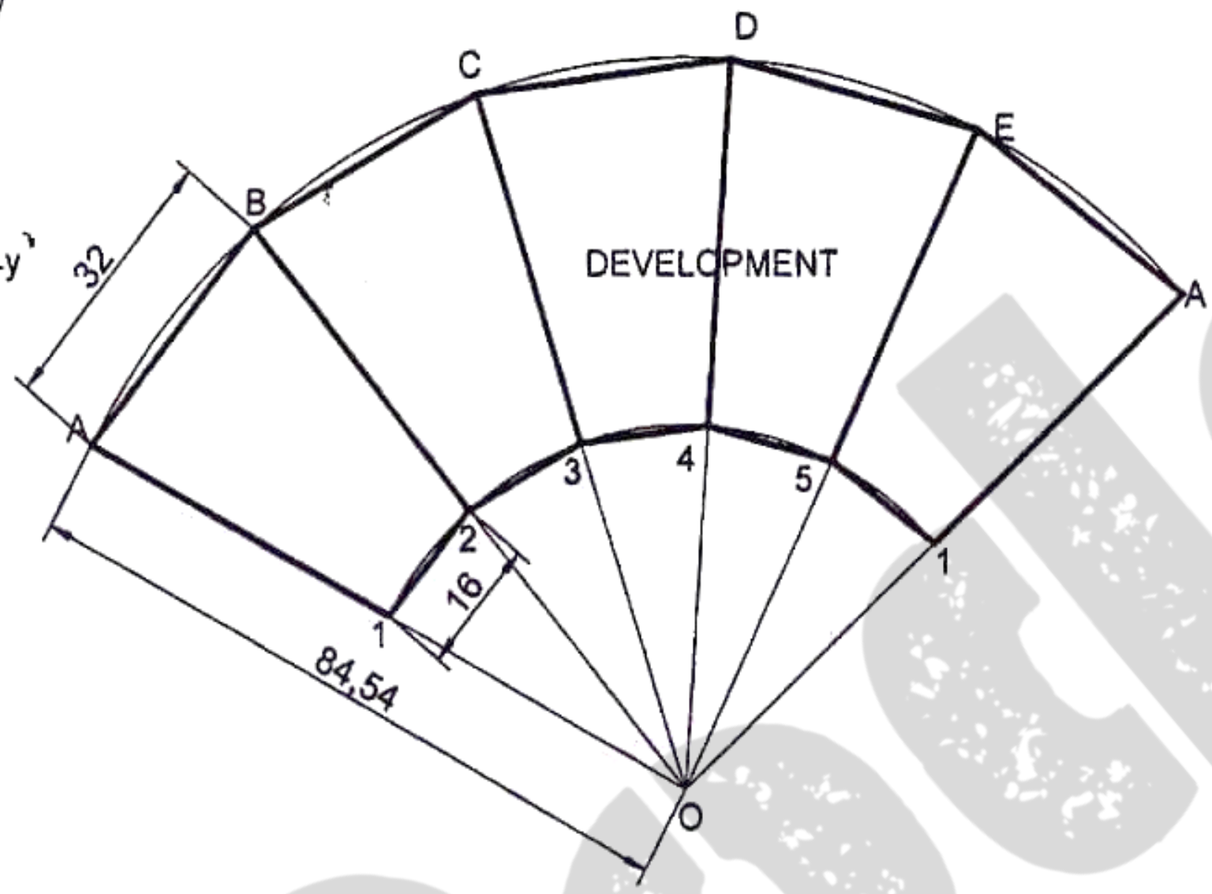




Problem 23 A frustum of a pentagonal pyramid, smaller base sides 16mm and bigger top face sides 32mm and height 40mm, is resting on the HP on its smaller base, with one of its base sides parallel to the VP. Draw the projections of the frustum and develop the lateral surface it.

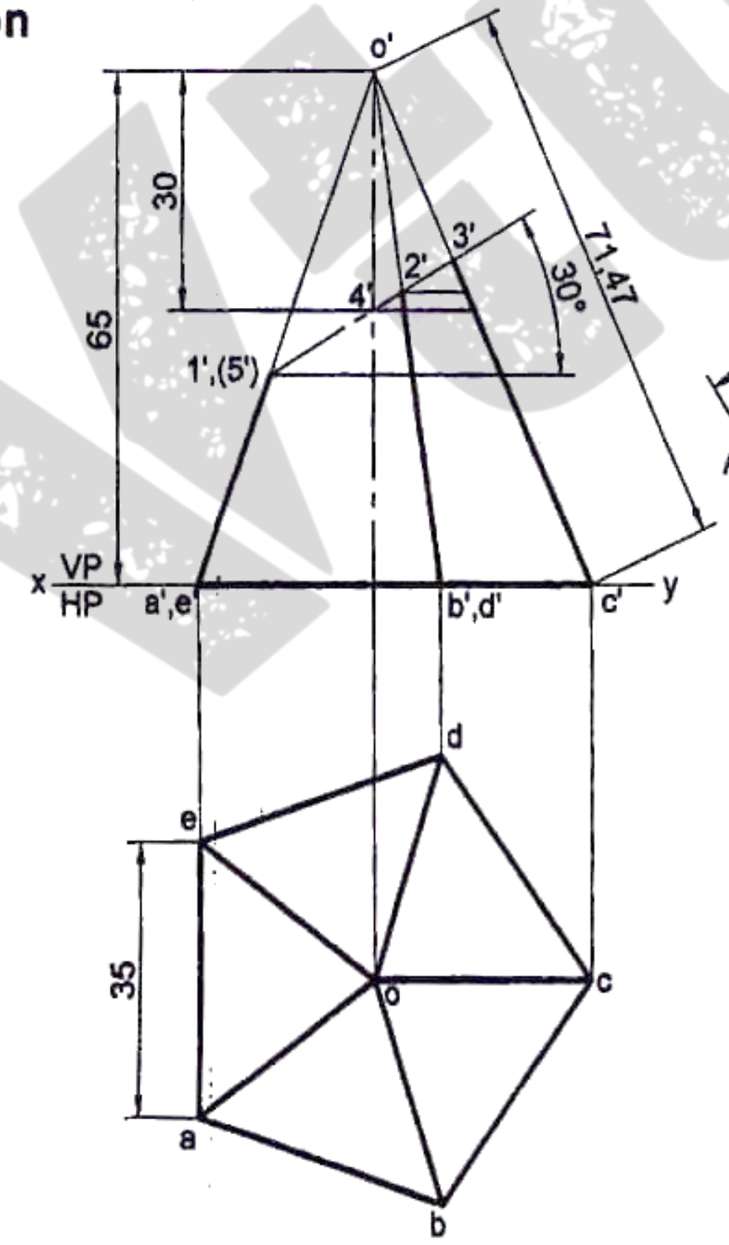
Solution

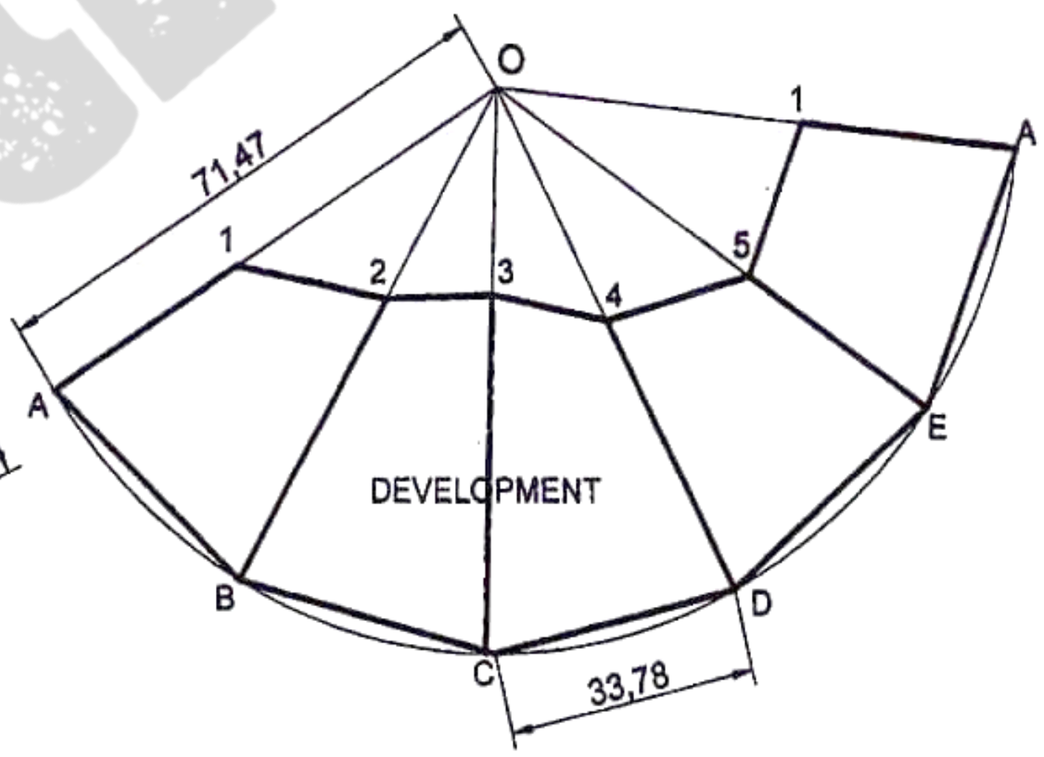




Problem 24 A regular pentagonal pyramid of side of base 35mm and altitude 65mm has its base on HP with a side of base perpendicular to VP. The pyramid is cut by a section plane which is perpendicular to the VP and inclined at 30° to HP. The cutting plane meets the axis of the pyramid at a point 30mm below the vertex. Obtain the development of the remaining part of the pyramid.

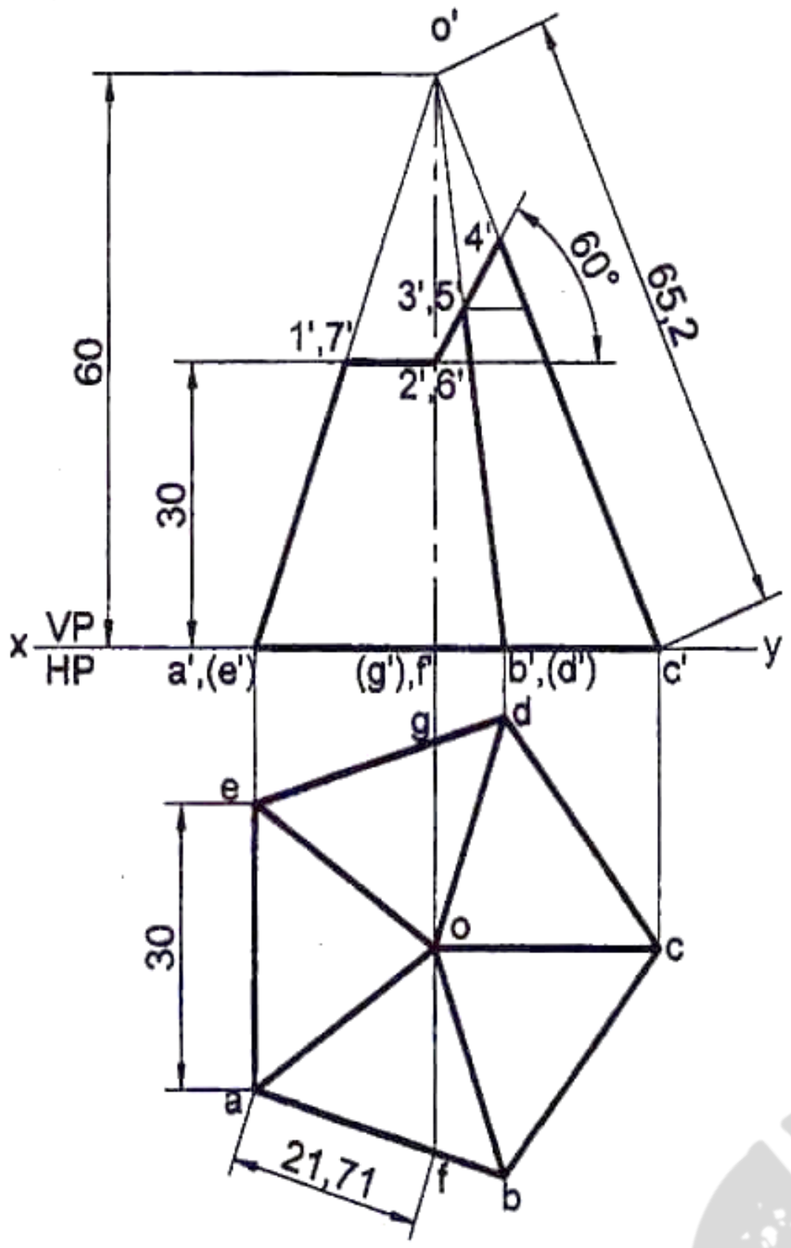
Solution

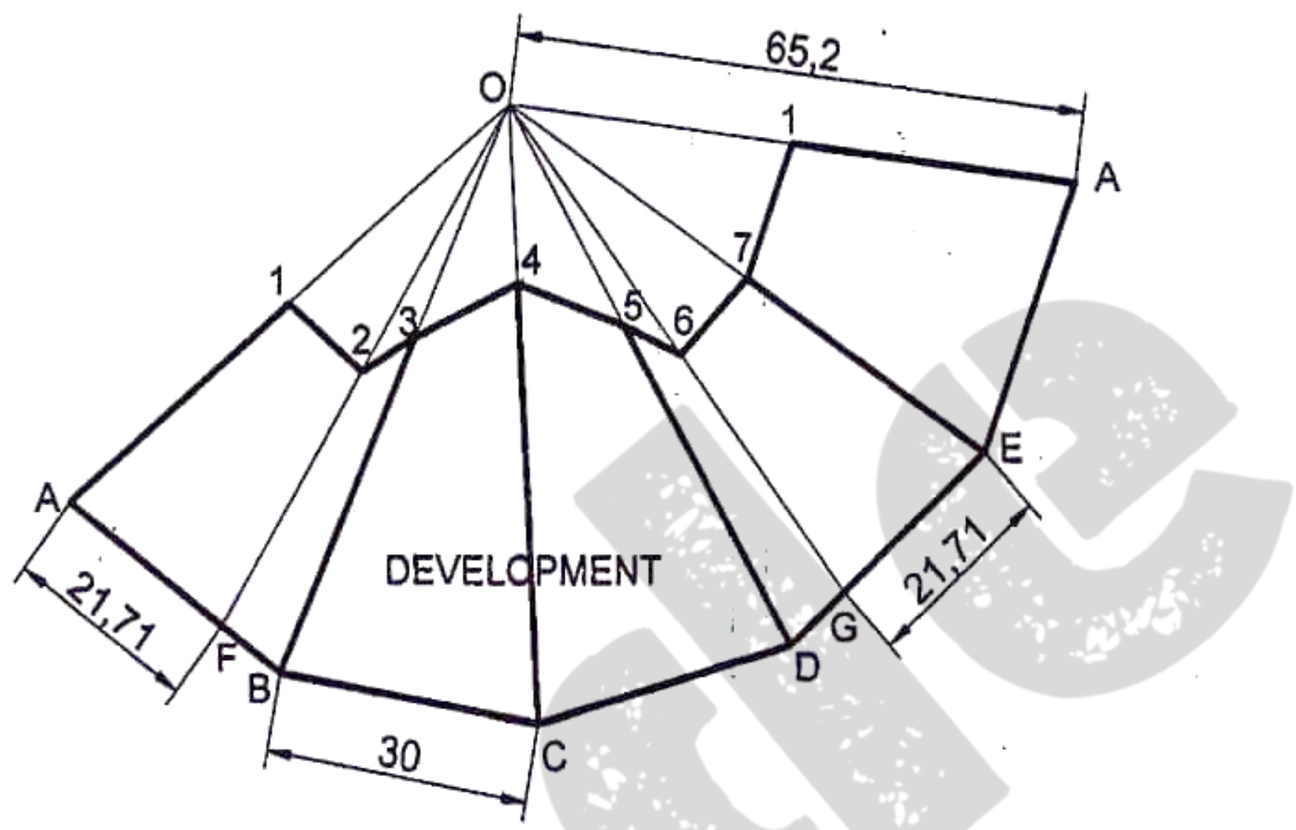




Problem 25 A pentagonal pyramid, 30mm sides, with a side of base perpendicular to VP. Draw the development of the lateral surfaces of the retained portion of the pyramid shown by the dark lines in the following figure.

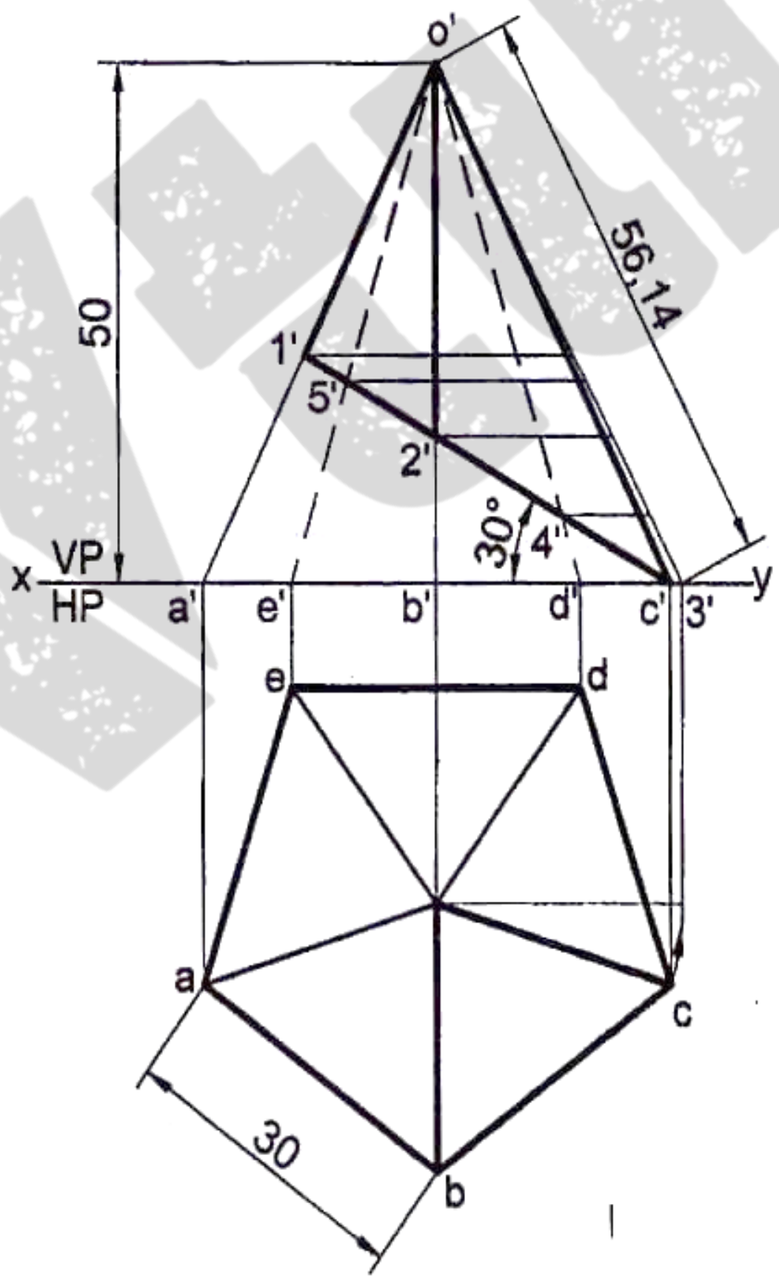
Solution

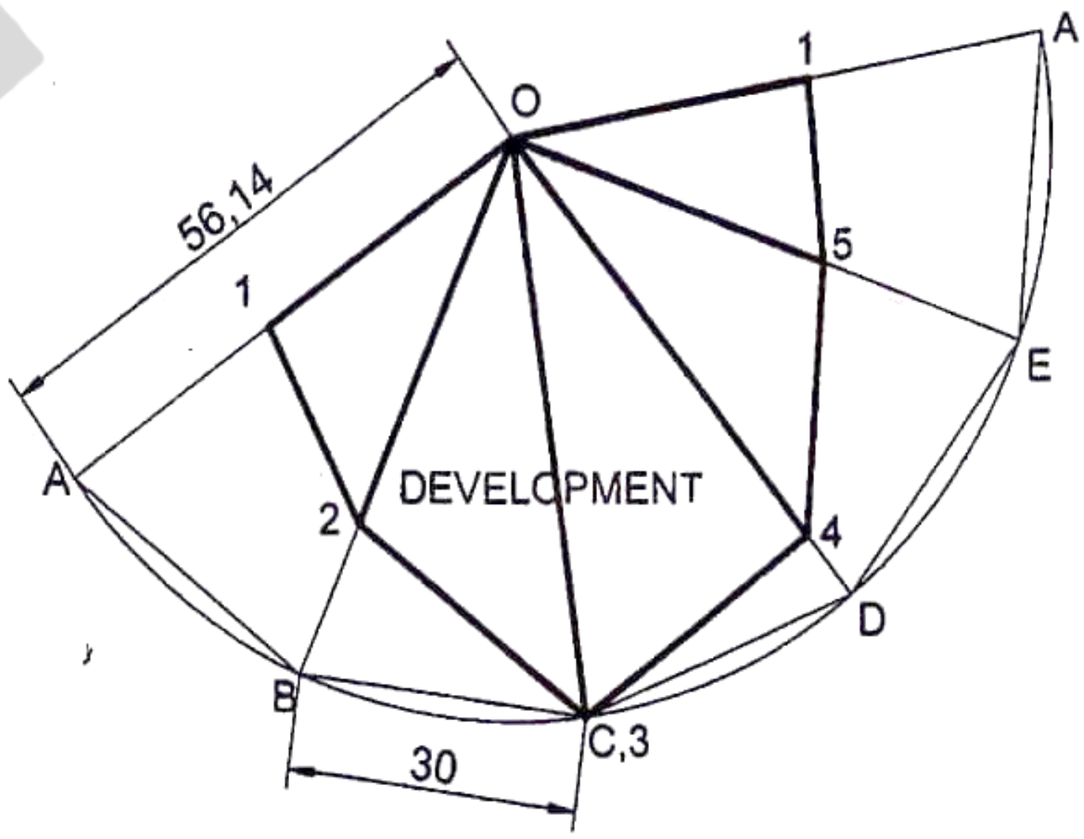




Problem 26 A pentagonal pyramid of 30mm edges of base and 50mm height rests vertically with one of its base edges parallel to VP and nearer to it. It is cut as shown in following figure. Draw the development of the lateral surfaces of the upper portion of the pyramid.

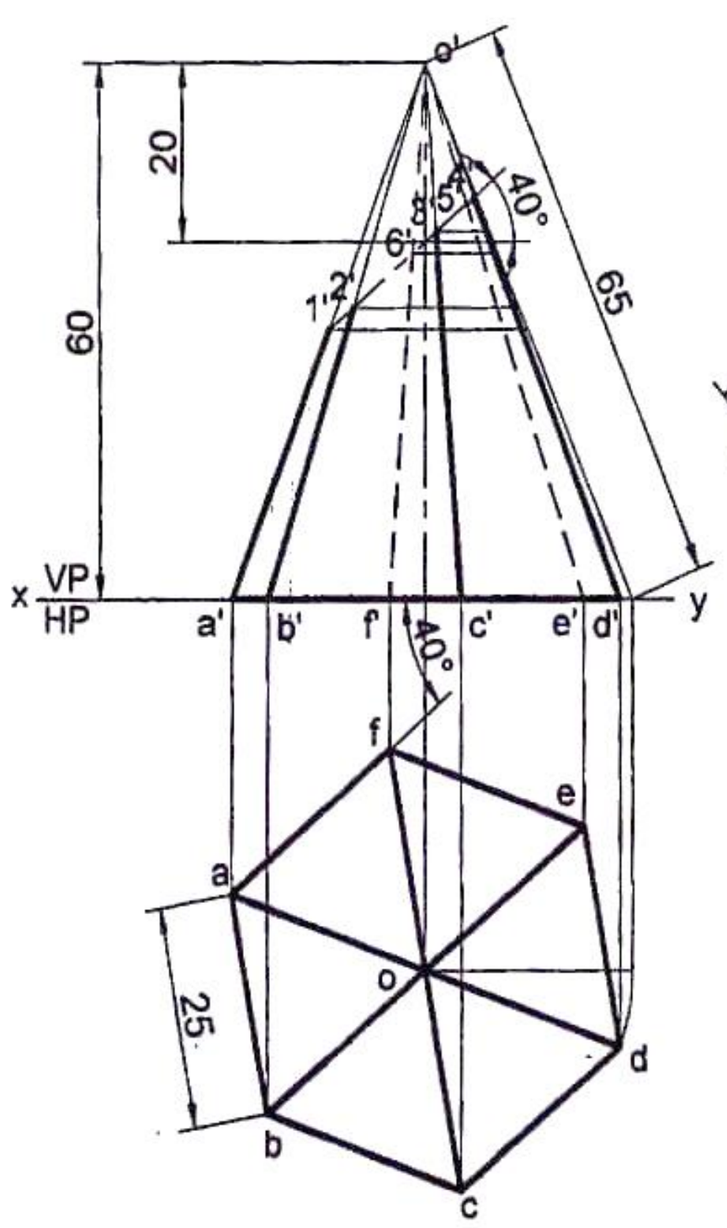
Solution

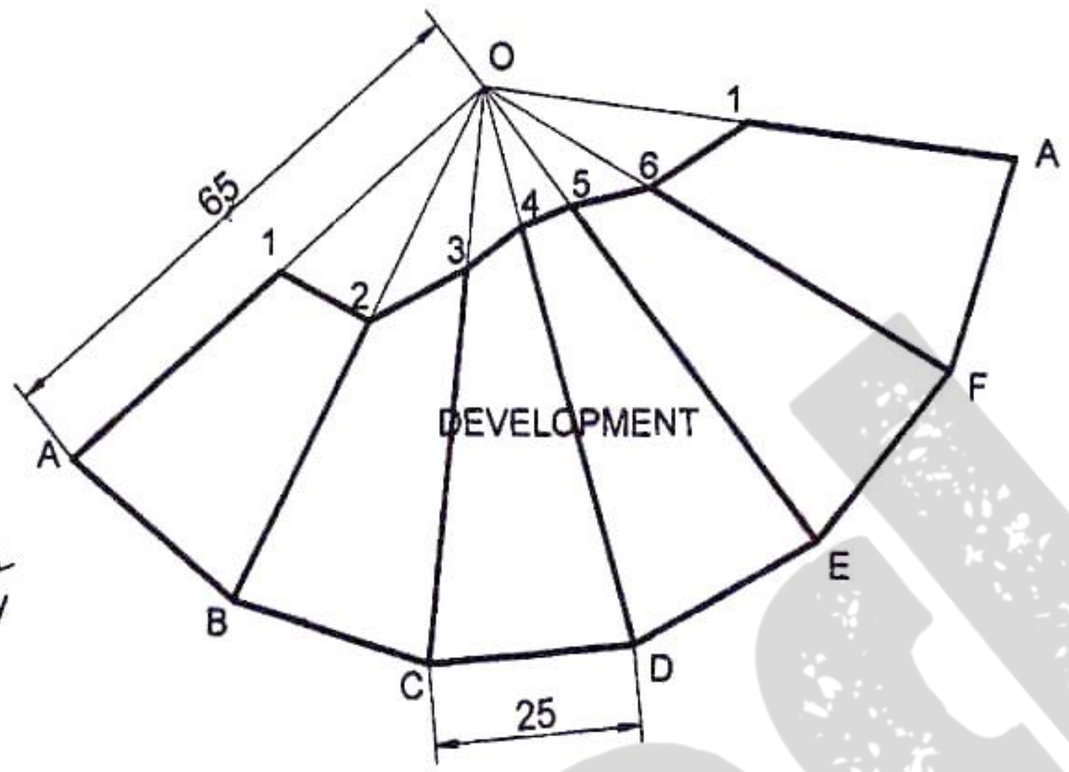




Problem 27 A hexagonal pyramid, base sides 25mm and height 60mm, is resting with its base on HP and an edge of base inclined at 40° to VP. It is cut to the shape of a truncated pyramid with the truncated surface indicated in the front view at a point on the axis 20mm from the apex and inclined at 40° to XY. Draw the projections and show the development of the lateral surface of the remaining portion of the pyramid.

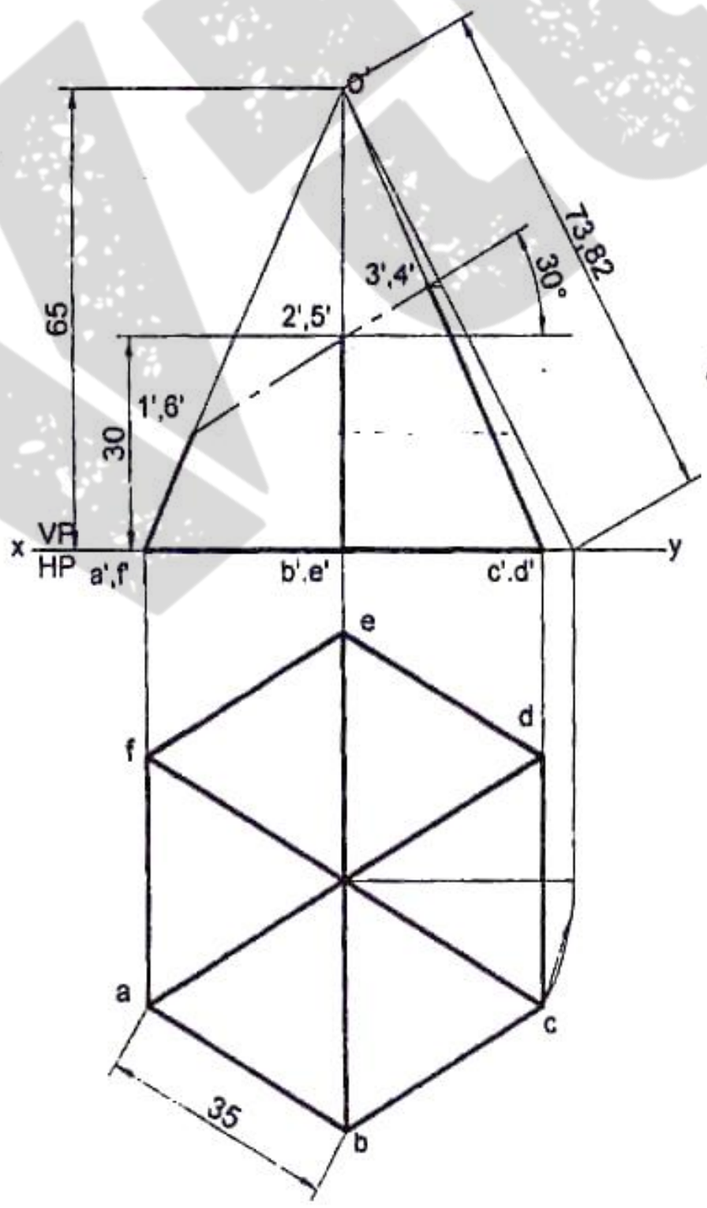
Solution

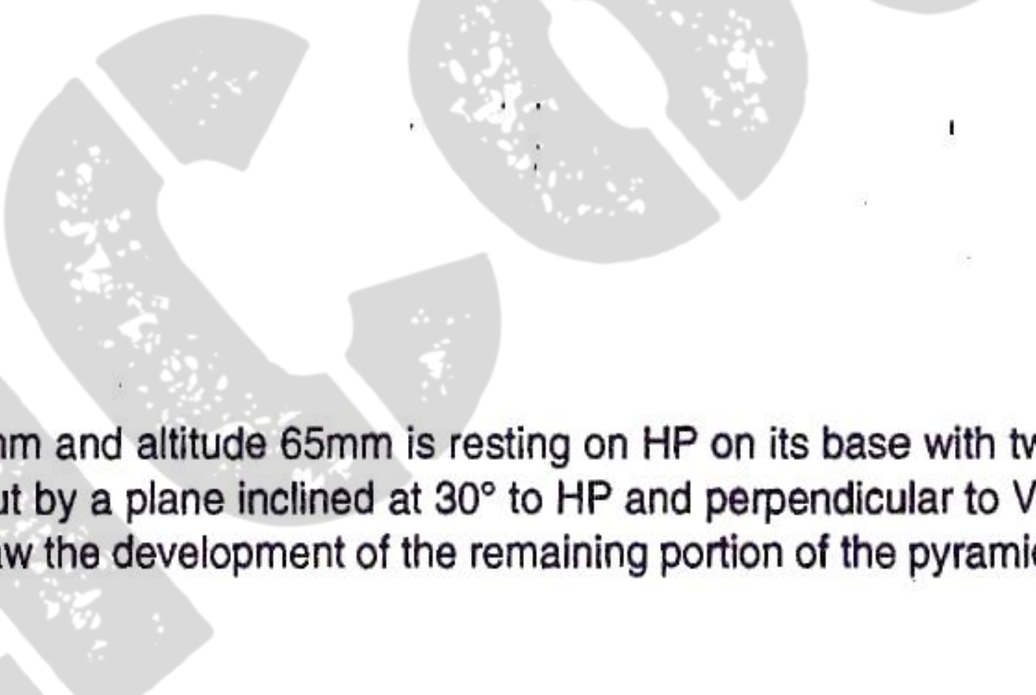




Problem 28 A hexagonal pyramid of sides 35mm and altitude 65mm is resting on HP on its base with two of the base sides perpendicular to VP. The pyramid is cut by a plane inclined at 30° to HP and perpendicular to VP and is intersecting the axis at 30mm above the base. Draw the development of the remaining portion of the pyramid.

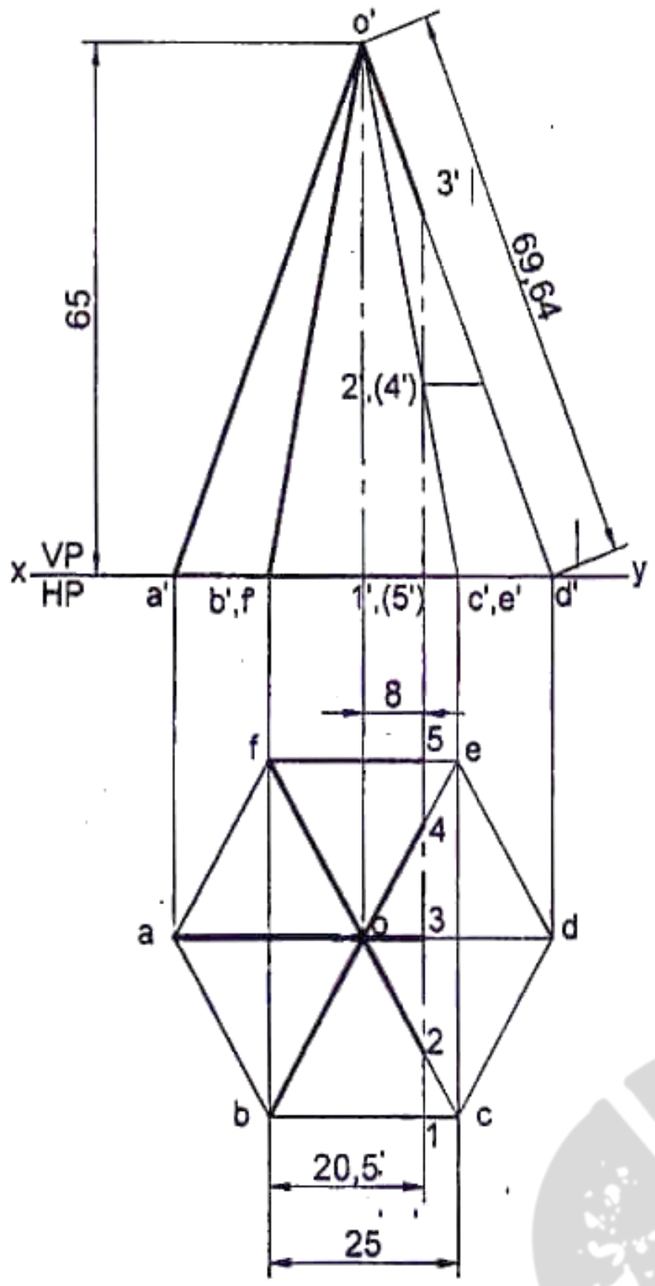
Solution

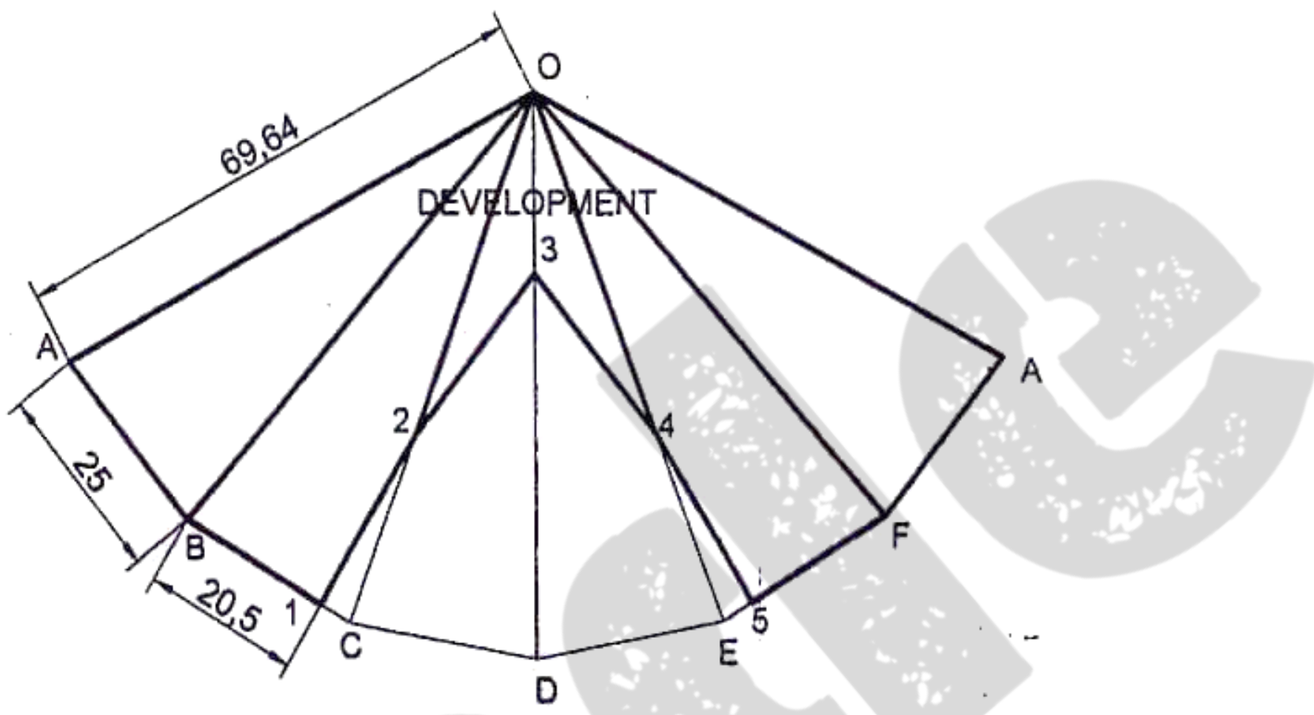




Problem 29 A hexagonal pyramid 25 mm side of base and axis 65 mm long is resting on its base on HP with one of the edges of the base parallel to VP. It is cut by a vertical section plane at a distance of 8 mm from the axis towards right side. Develop the lateral surface of the left part of the pyramid.

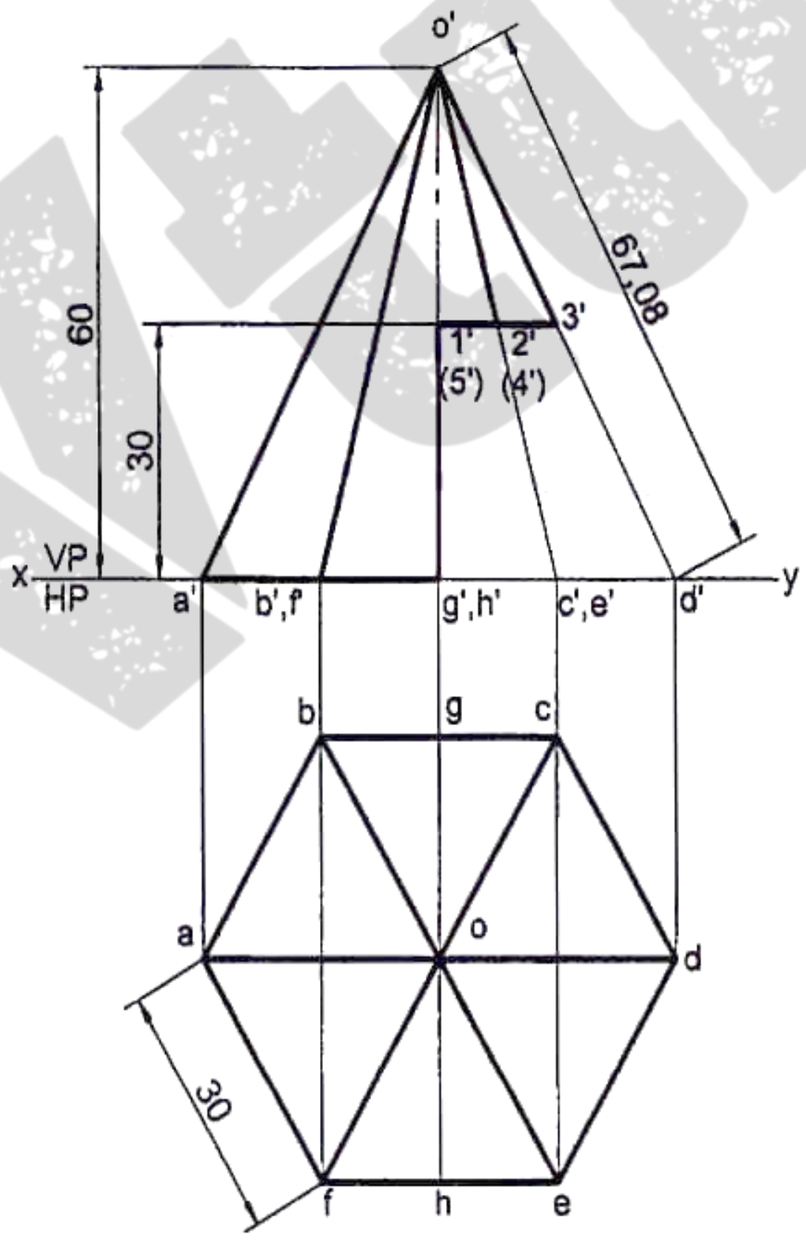
Solution

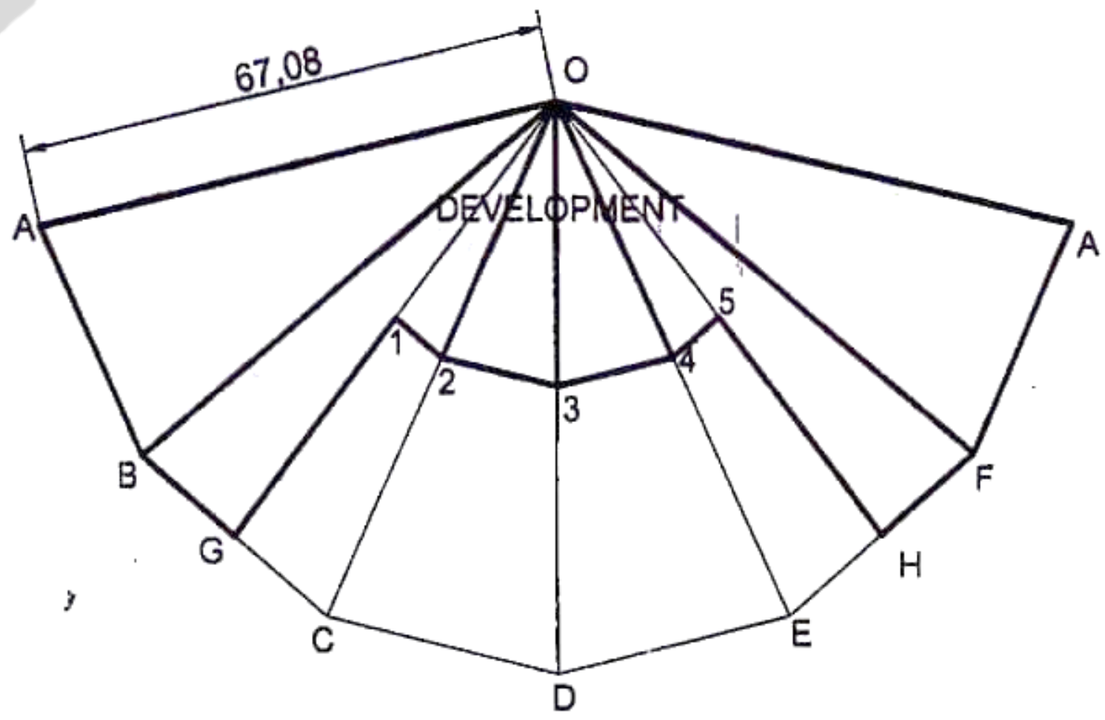




Problem 30 A hexagonal pyramid of 30mm base sides with a side of base parallel to VP. Draw the development of the lateral surfaces of the retained portions of the pyramid cut by two perpendicular planes shown by dark lines in the Fig.

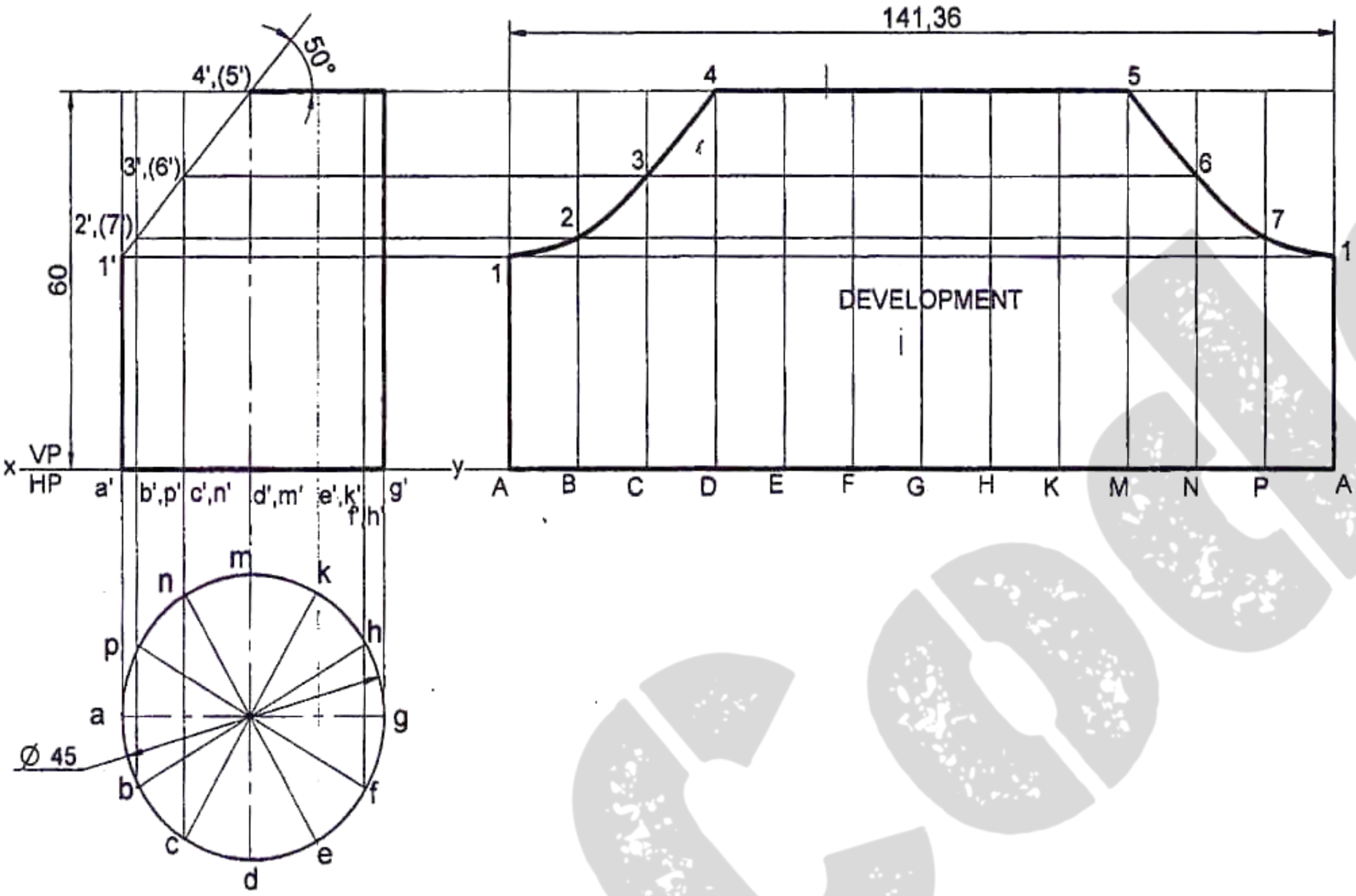
Solution





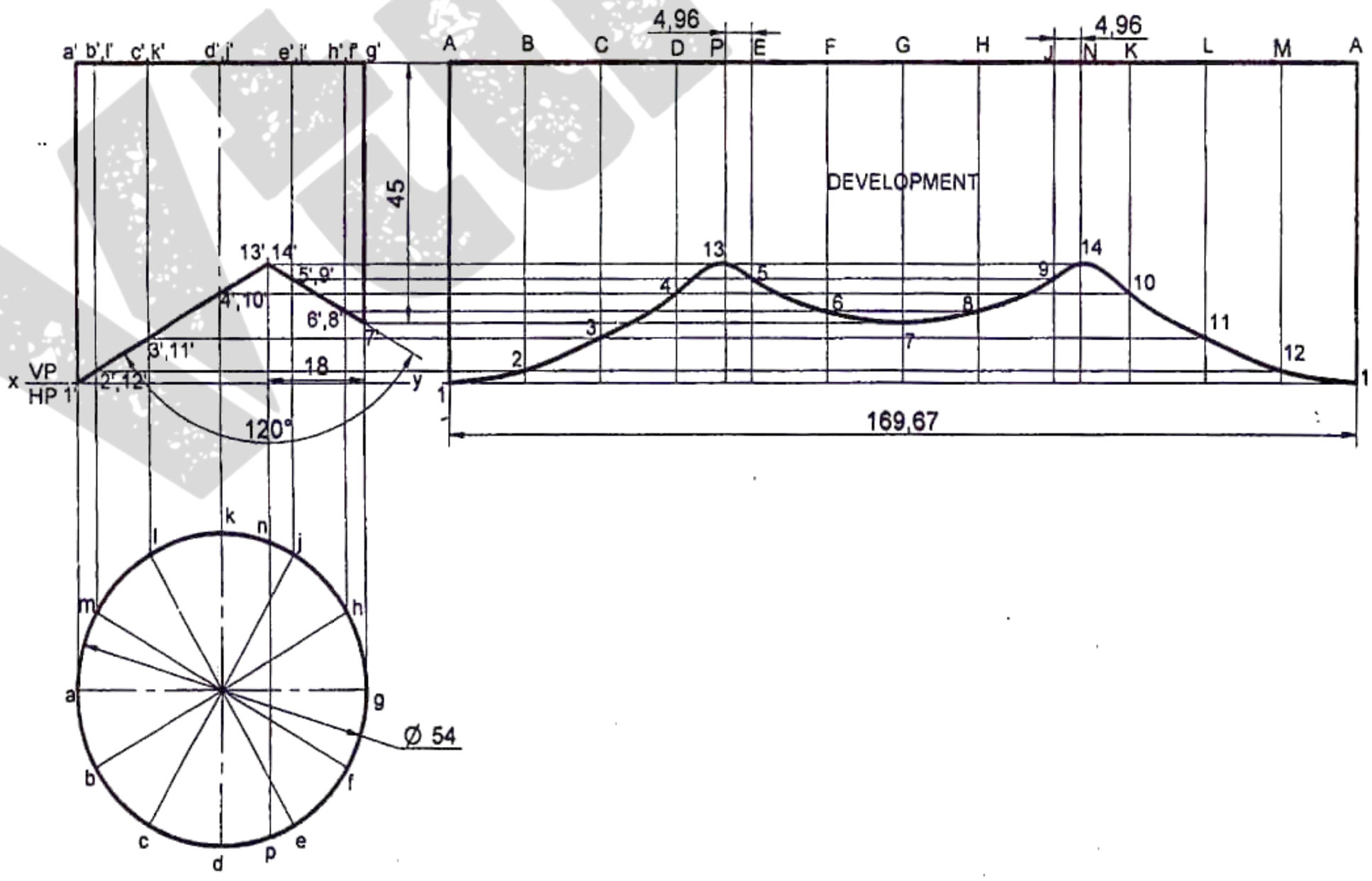
Problem 31 A vertical cylinder of base diameter 45mm and axis length 60mm is cut by a plane perpendicular to VP and inclined at 50° to HP, is passing through the centre point of the top face. Draw the development of the lateral surface of the cylinder.

Solution



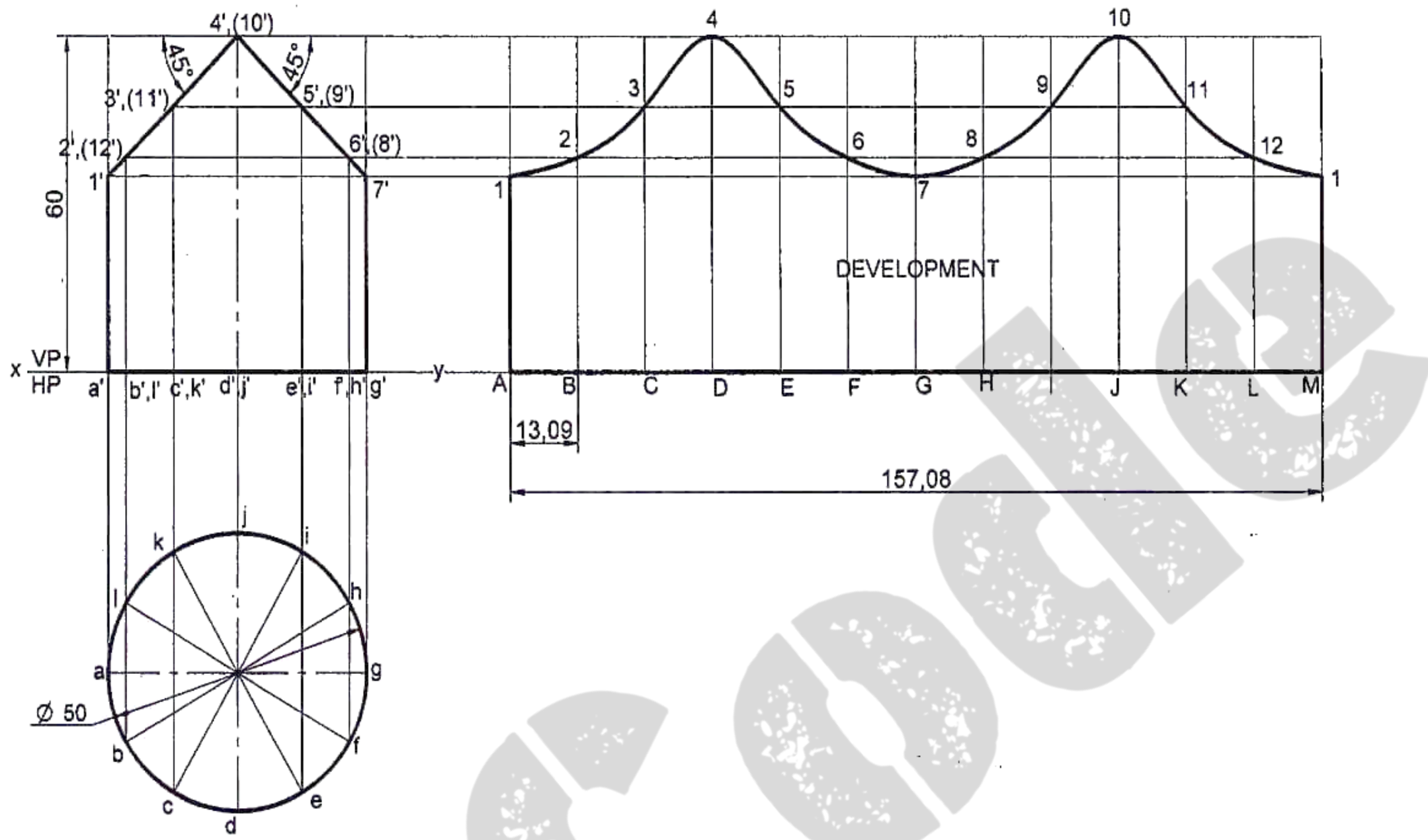
Problem 32 Following figure shows the front view of a model of a steel chimney of diameter 60mm made from a flat thin sheet metal fitted over an inclined plane roof. Develop the portion of the chimney.

Solution



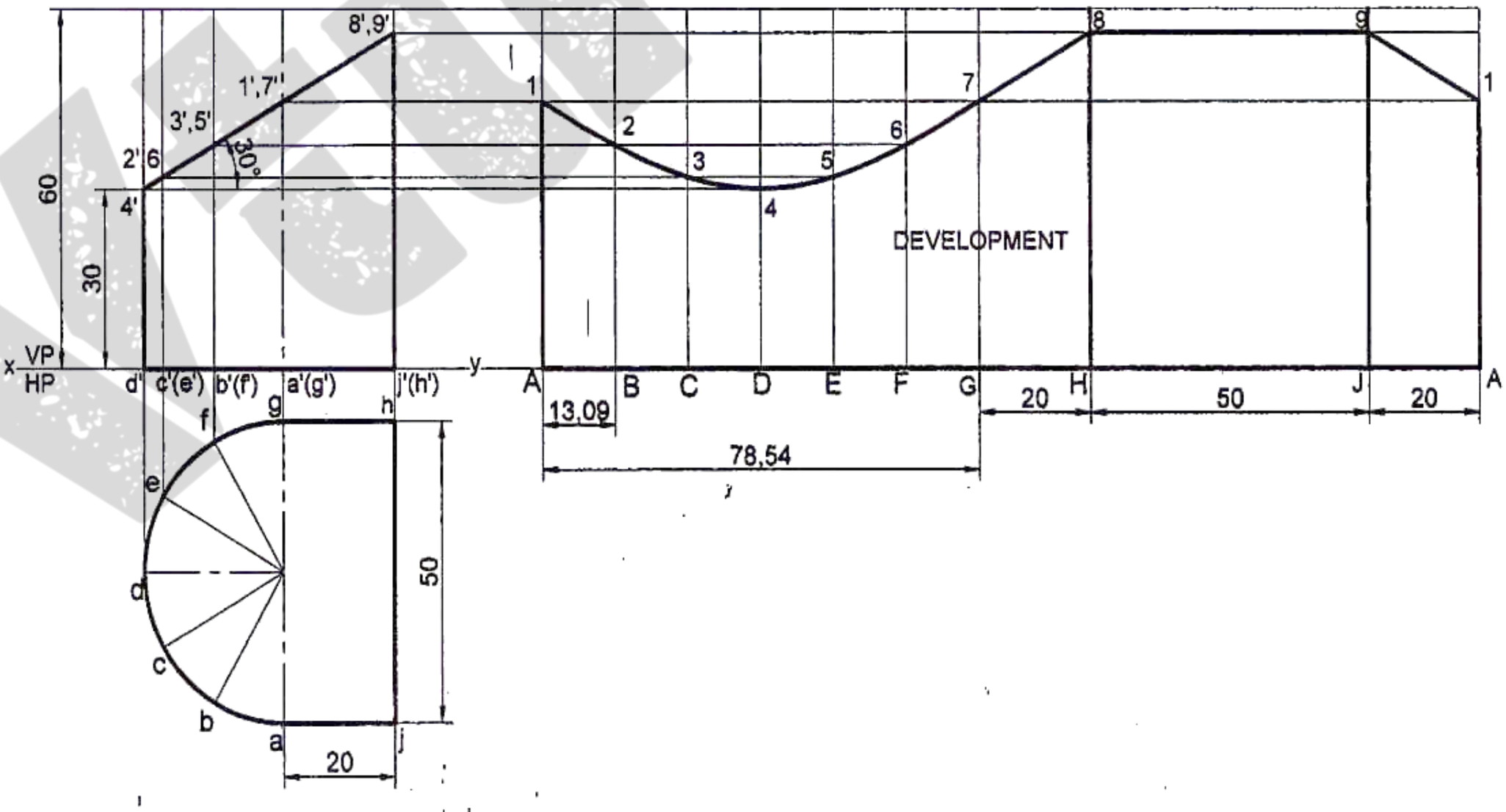
Problem 33 A vertical cylinder of base diameter 50mm and axis length 60mm is cut by a two planes which are perpendicular to VP and inclined at 45⁰ to HP and passing through either side the centre point of the top face. Draw the development of the lateral surface of the cylinder.

Solution



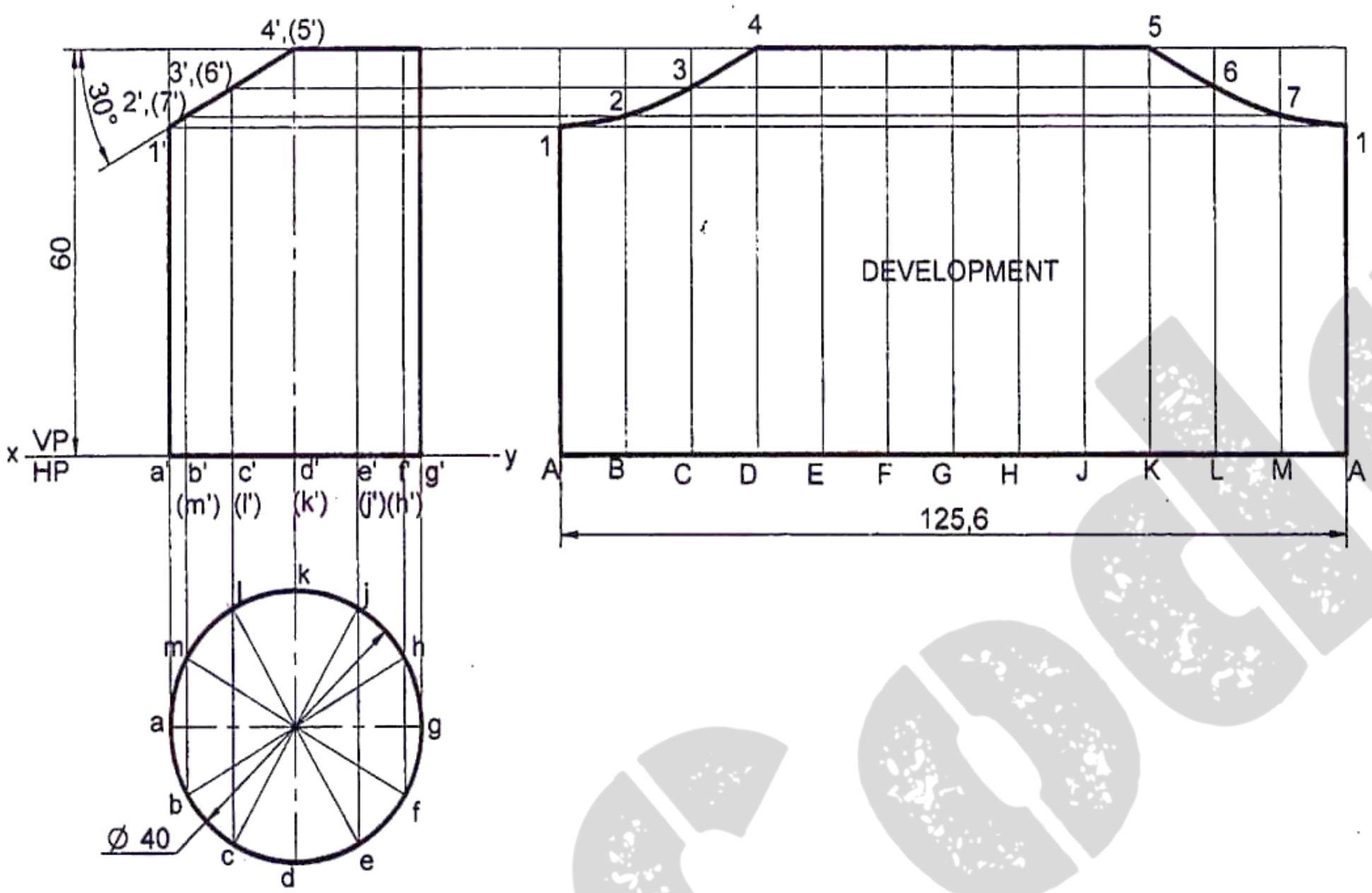
Problem 34 A pipe made of using a half tubular (circular) with a half square in shape is cut as shown in the following figure. Draw the development of the lateral surface of the object.

Solution



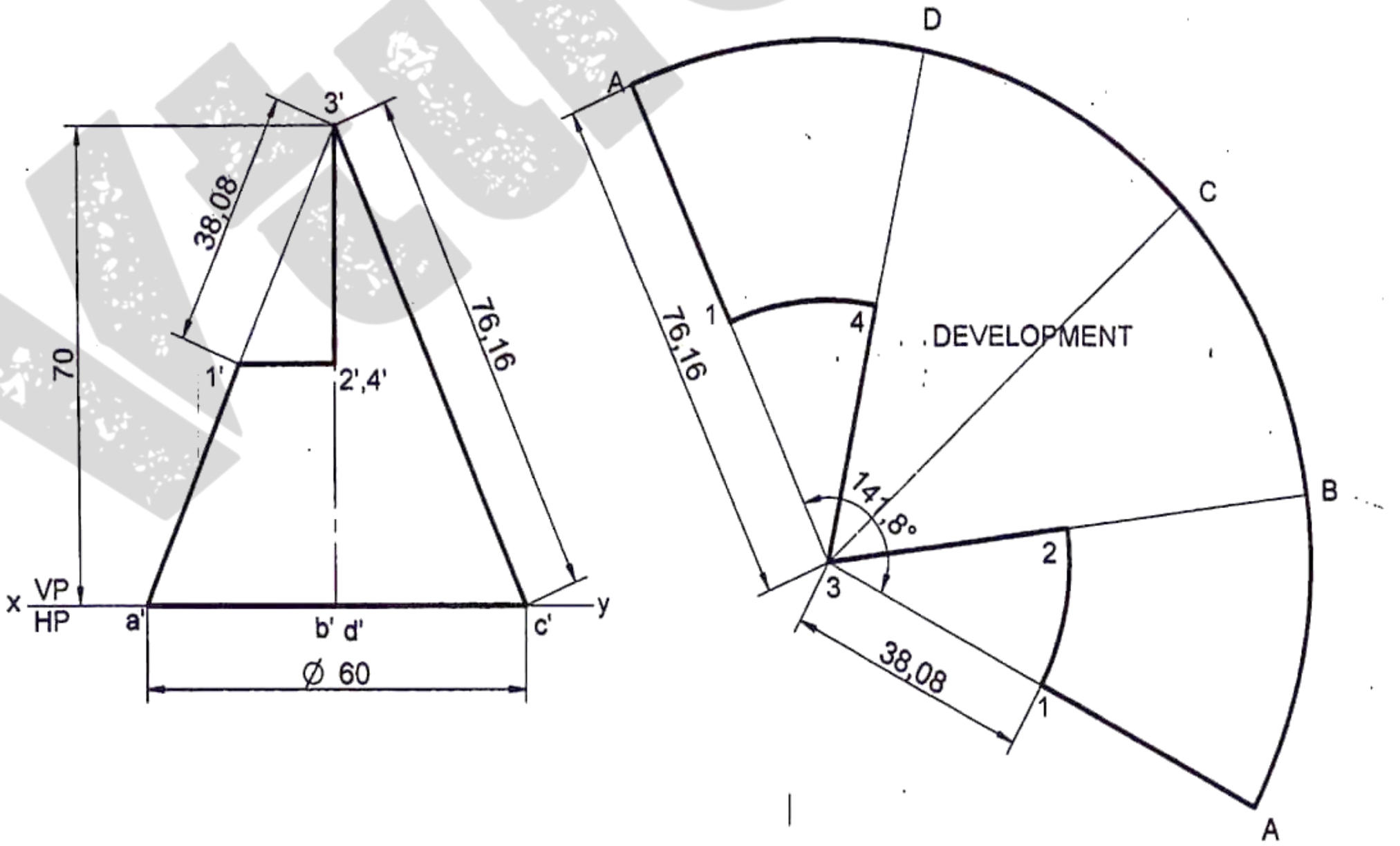
Problem 35 Develop the lateral surface of the cylinder of 40mm diameter and height 60mm which is cut in the following way.

Solution



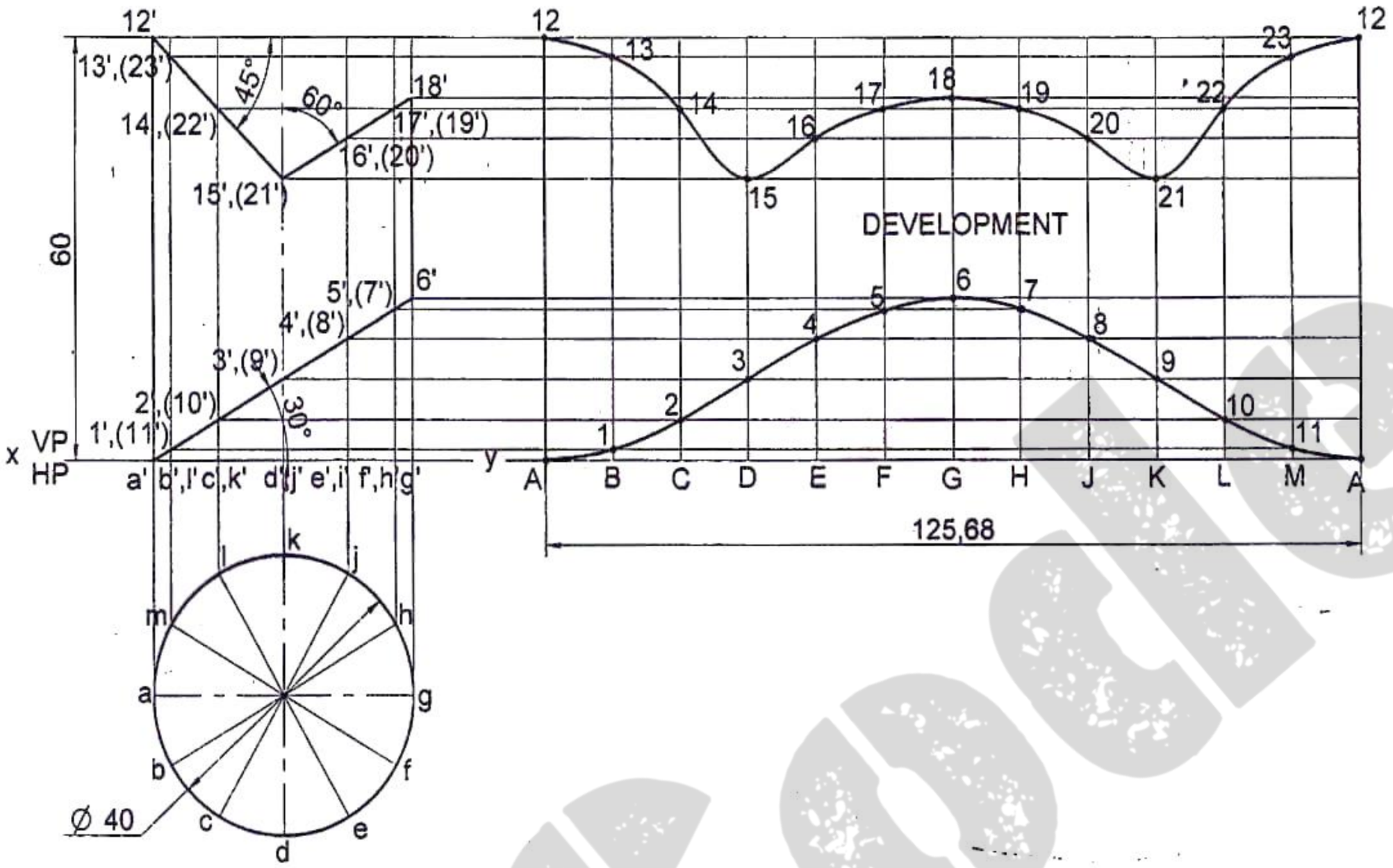
Problem 36 A cone of base diameter 60mm and height 70mm is resting on its base on HP. It is cut as shown in the following figure. Draw the development of the lateral surface of the remaining portion of the cone.

Solution



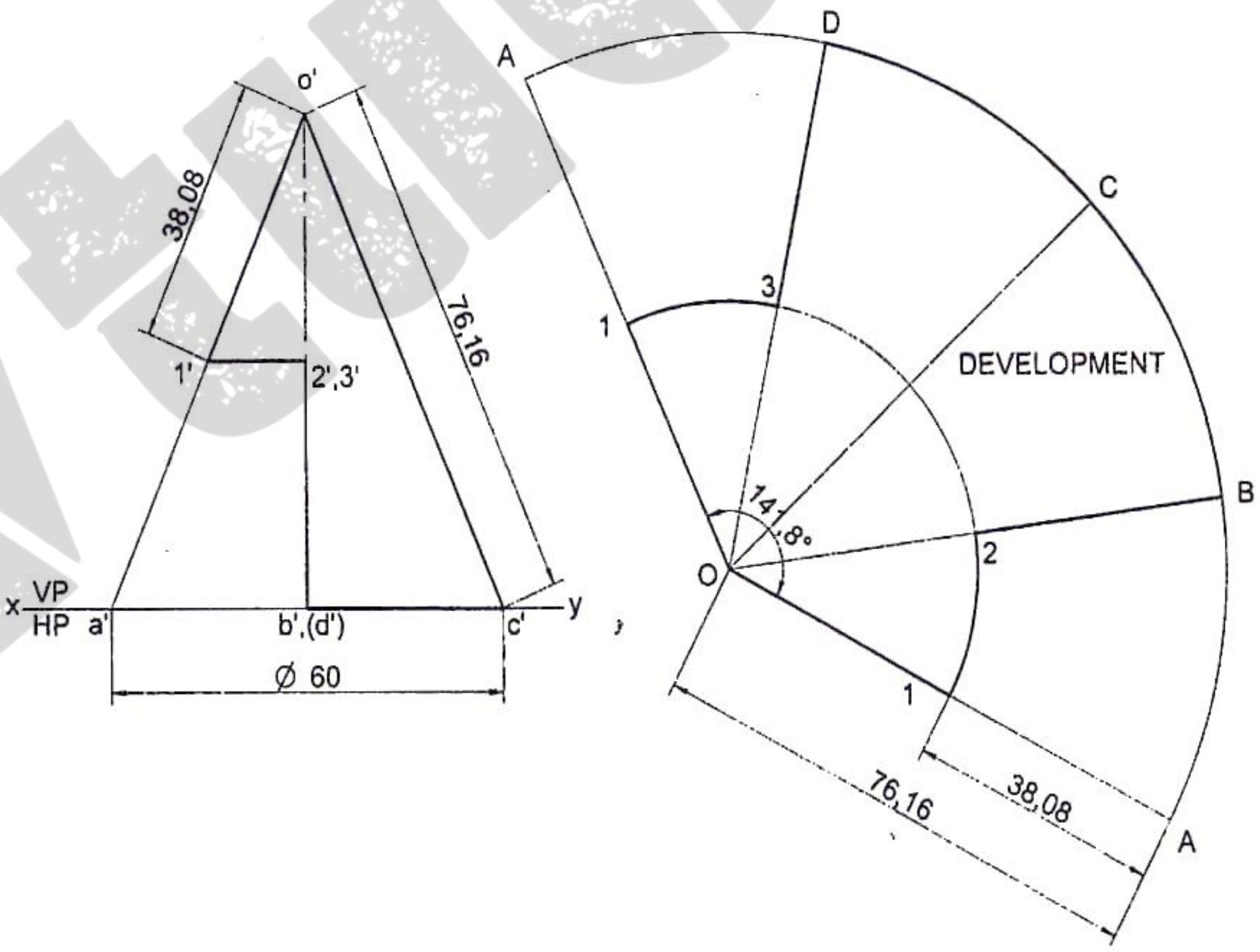
Problem 37 Develop the lateral surface of the cylinder of 40mm diameter and height 60mm which is cut in the following way.

Solution



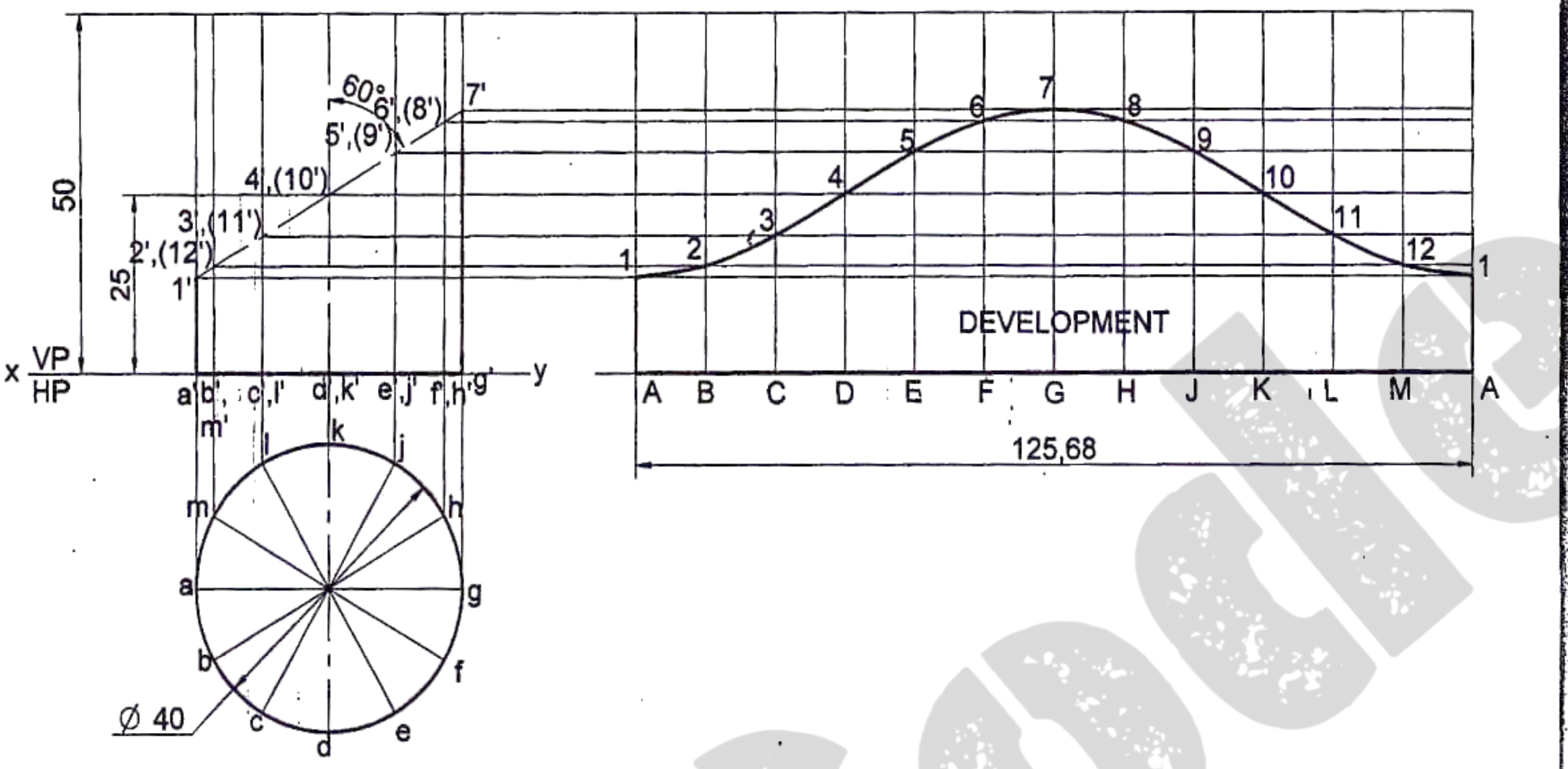
Problem 38 A cone of base diameter 60mm and height 70mm is resting on its base on HP. It is cut as shown in the following figure. Draw the development of the lateral surface of the remaining portion of the cone.

Solution



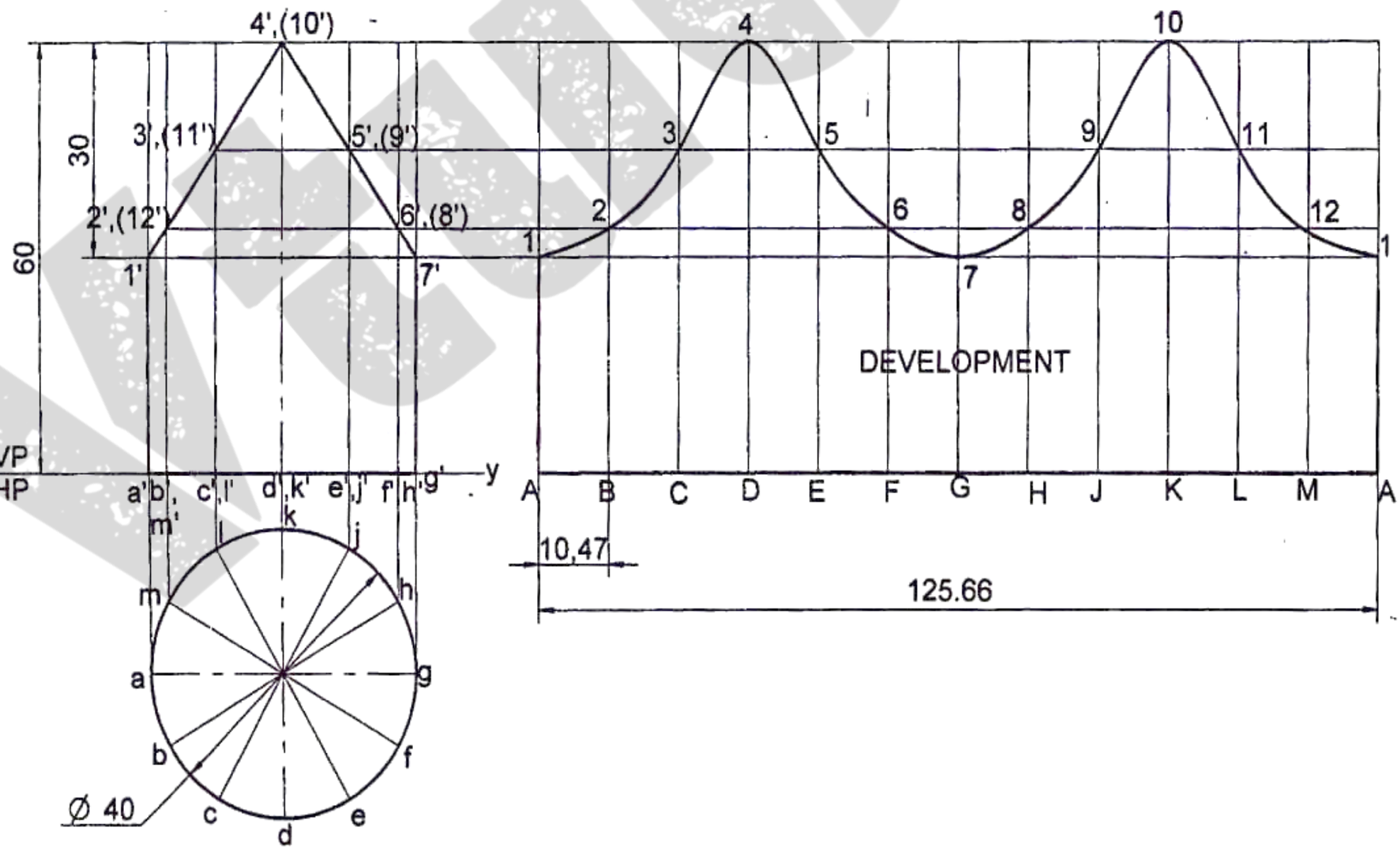
Problem 39 Draw the development of the lateral surface of a truncated vertical cylinder, 40mm diameter of base and height 50mm, the truncated flat surface of the cylinder bisects the axis at 60° to it.

Solution



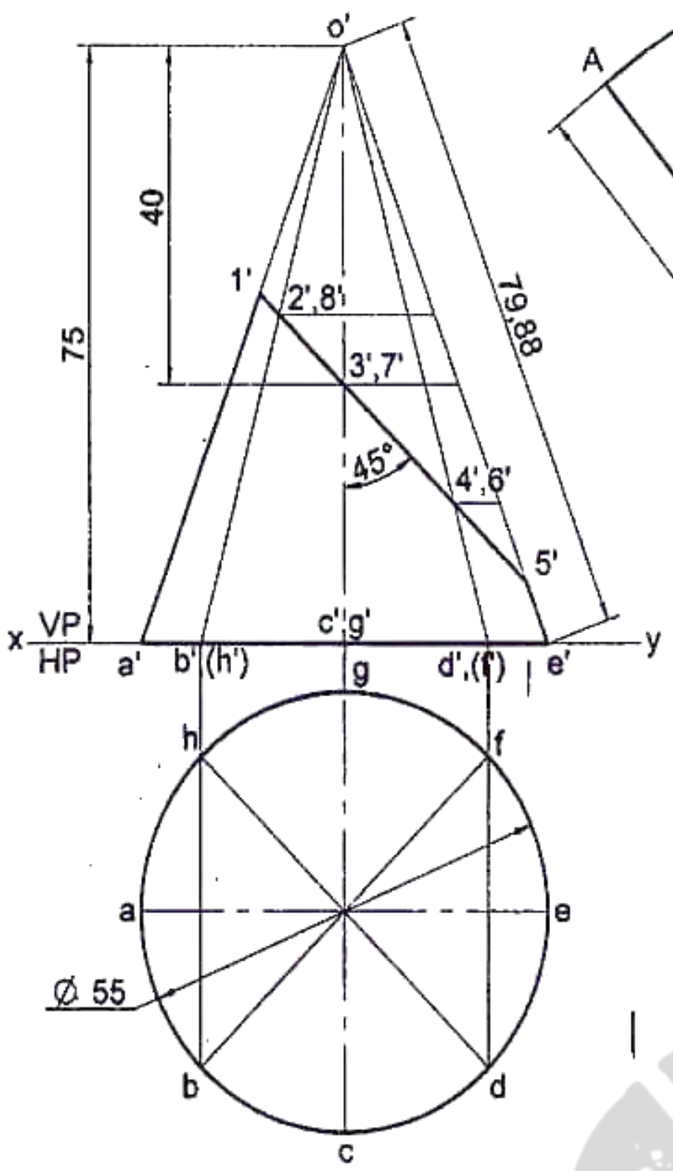
Problem 40 Develop the lateral surface of the cylinder of 40mm diameter and height 60mm cut in the following way.

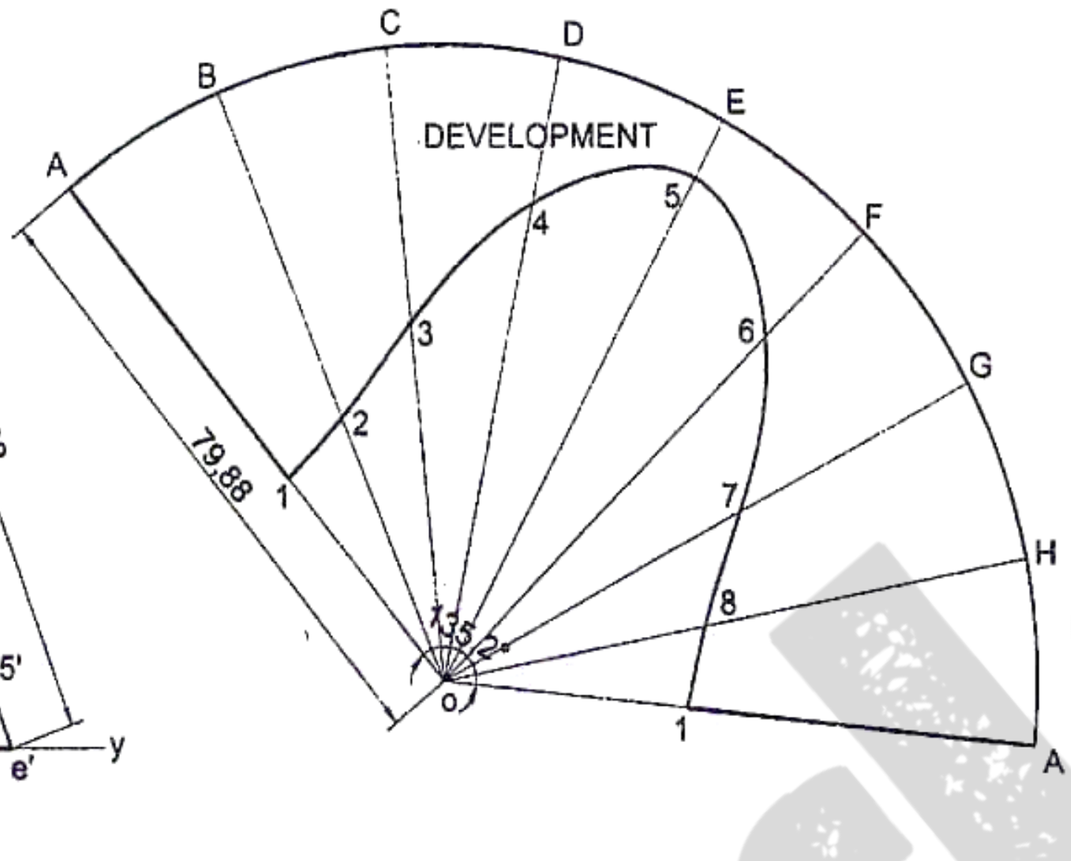
Solution



Problem 41 A right cone of 55mm diameter of base and 75mm height stands on its base on HP. It is cut to the shape of a truncated cone with its truncated surface inclined at 45° to the axis lying at a distance of 40mm from the apex of the cone. Obtain the development of the lateral surface of the truncated cone.

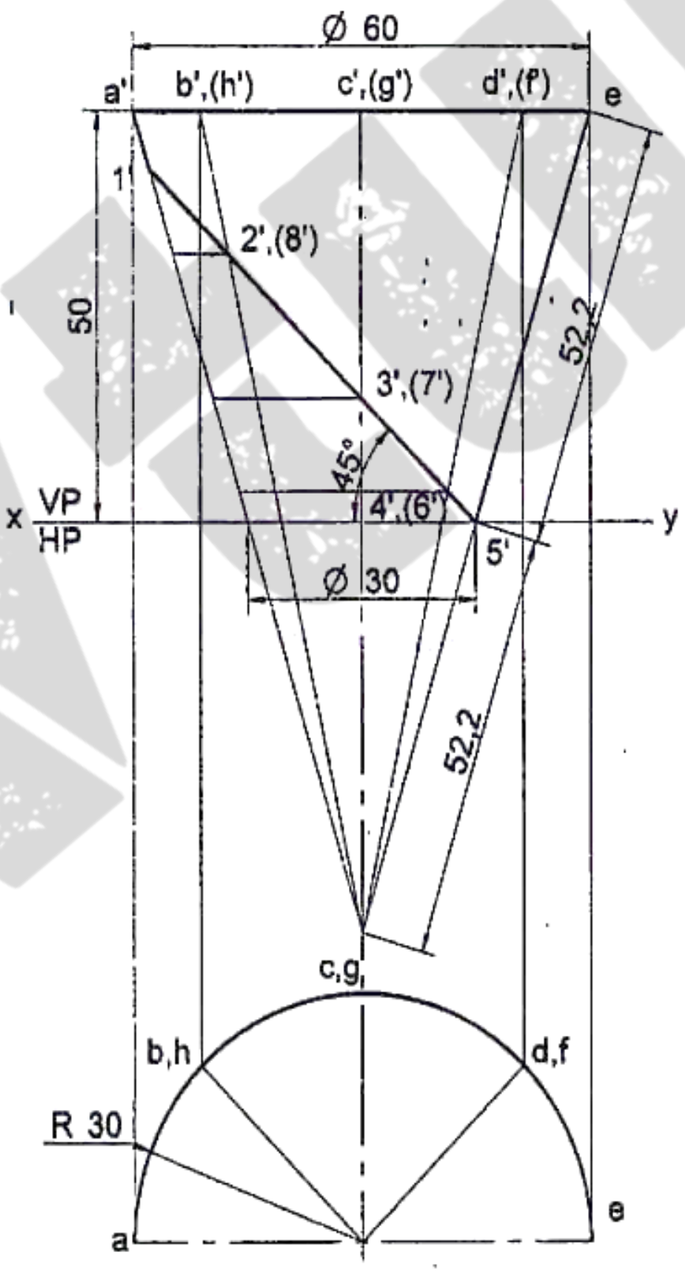
Solution

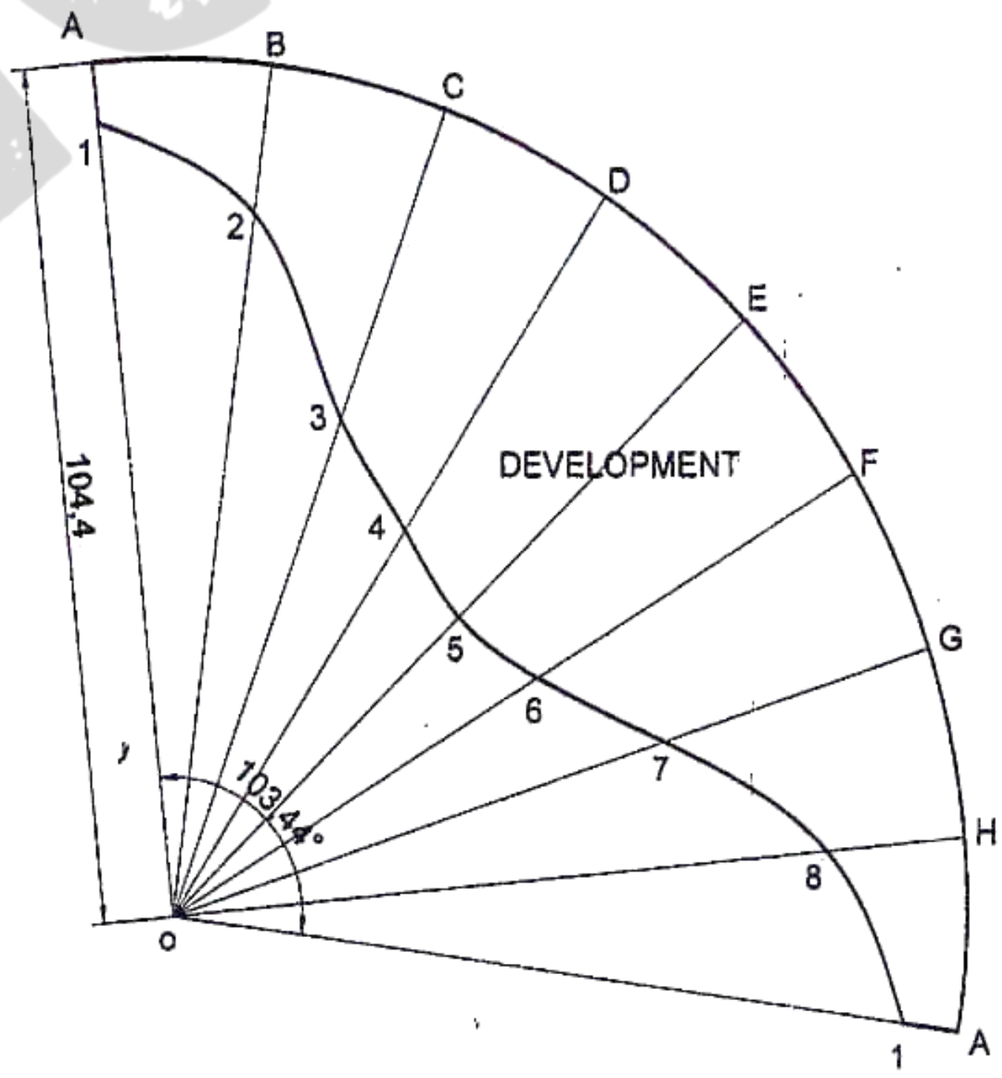




Problem 42 Draw the development of the following truncated cone.

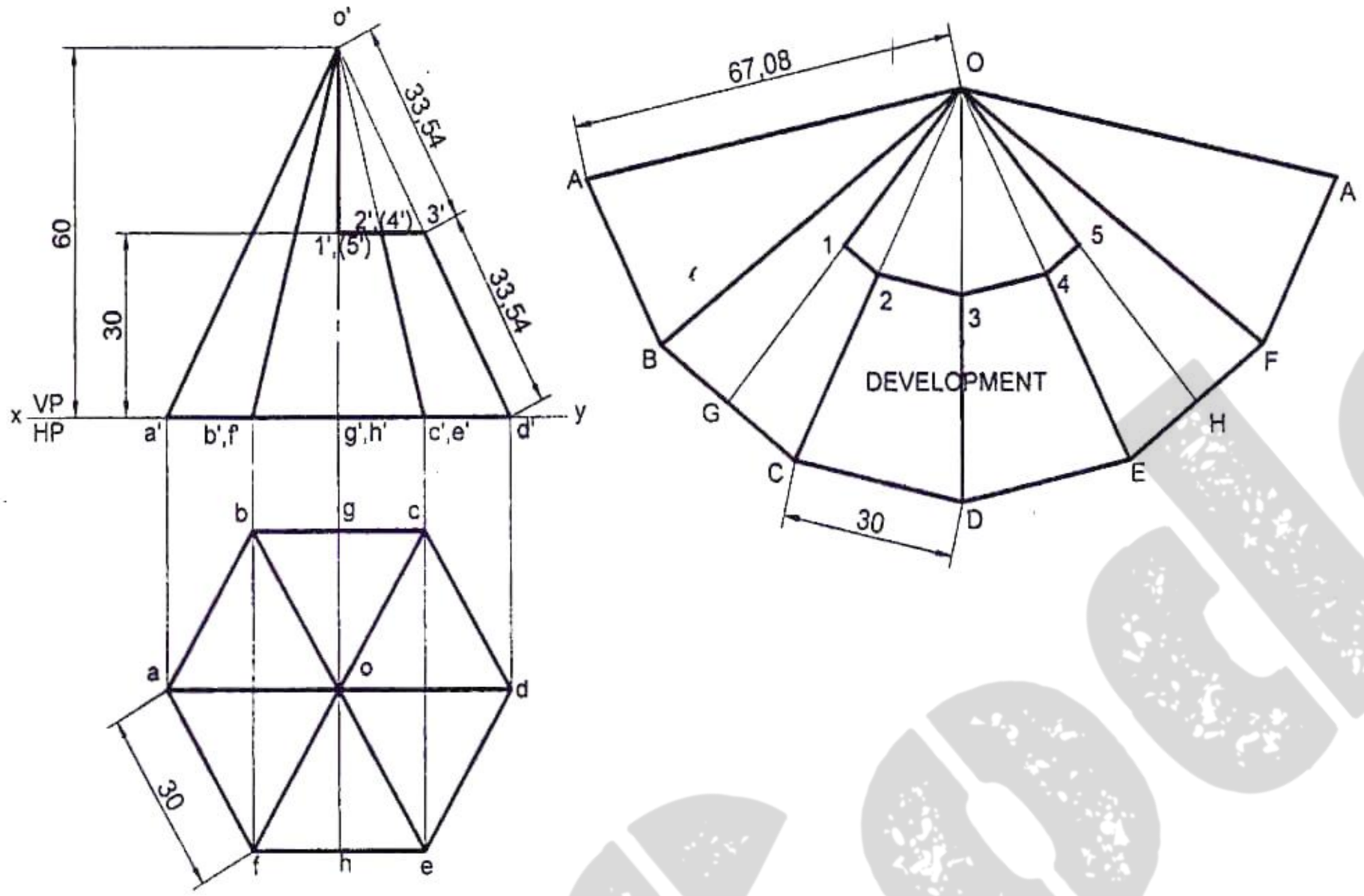
Solution





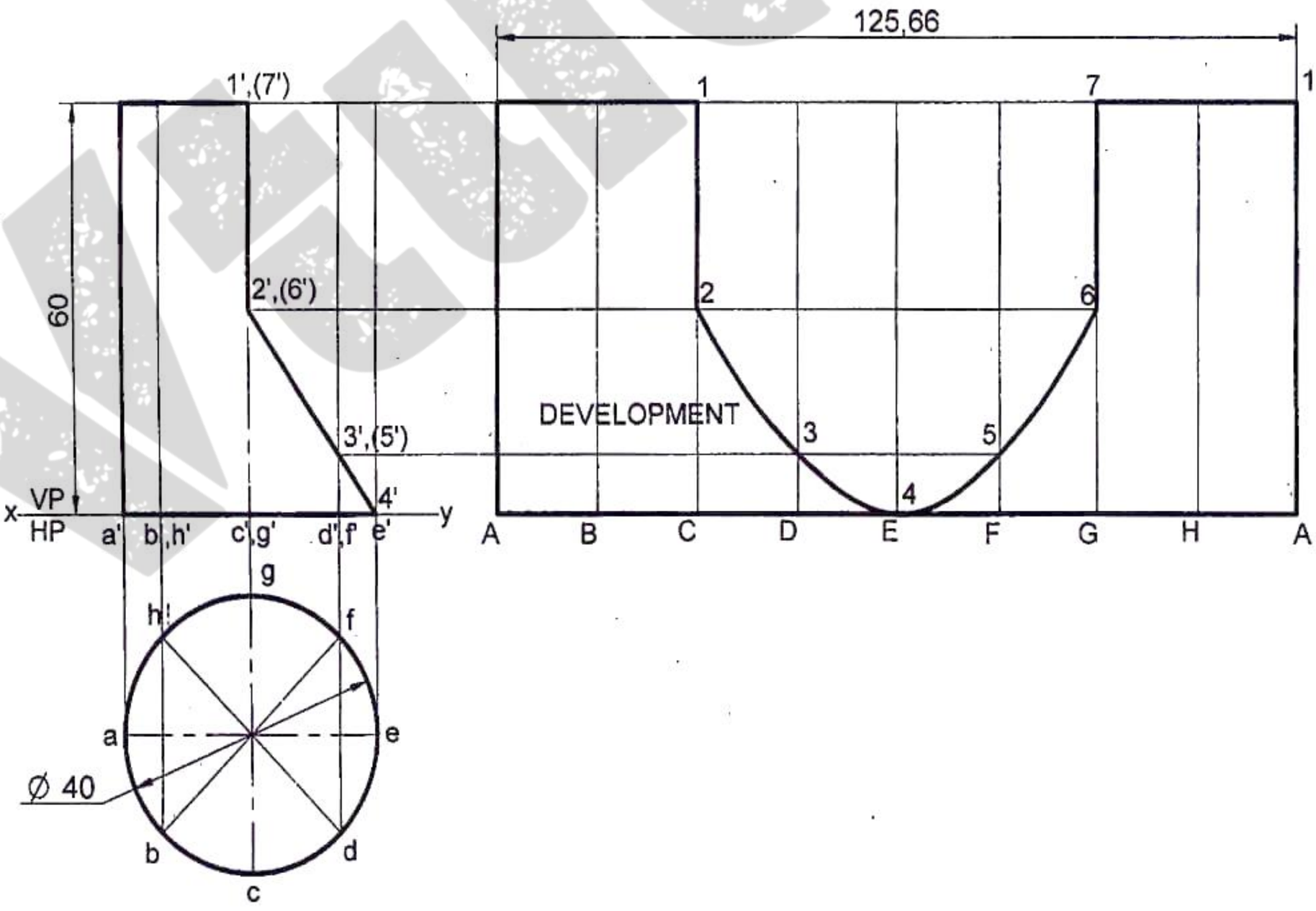
Problem 43 A hexagonal pyramid of 30mm sides of base with a side of base parallel to VP. Draw the development of the lateral surfaces of the retained portion of the pyramid which is shown by dark lines in the following figure.

Solution



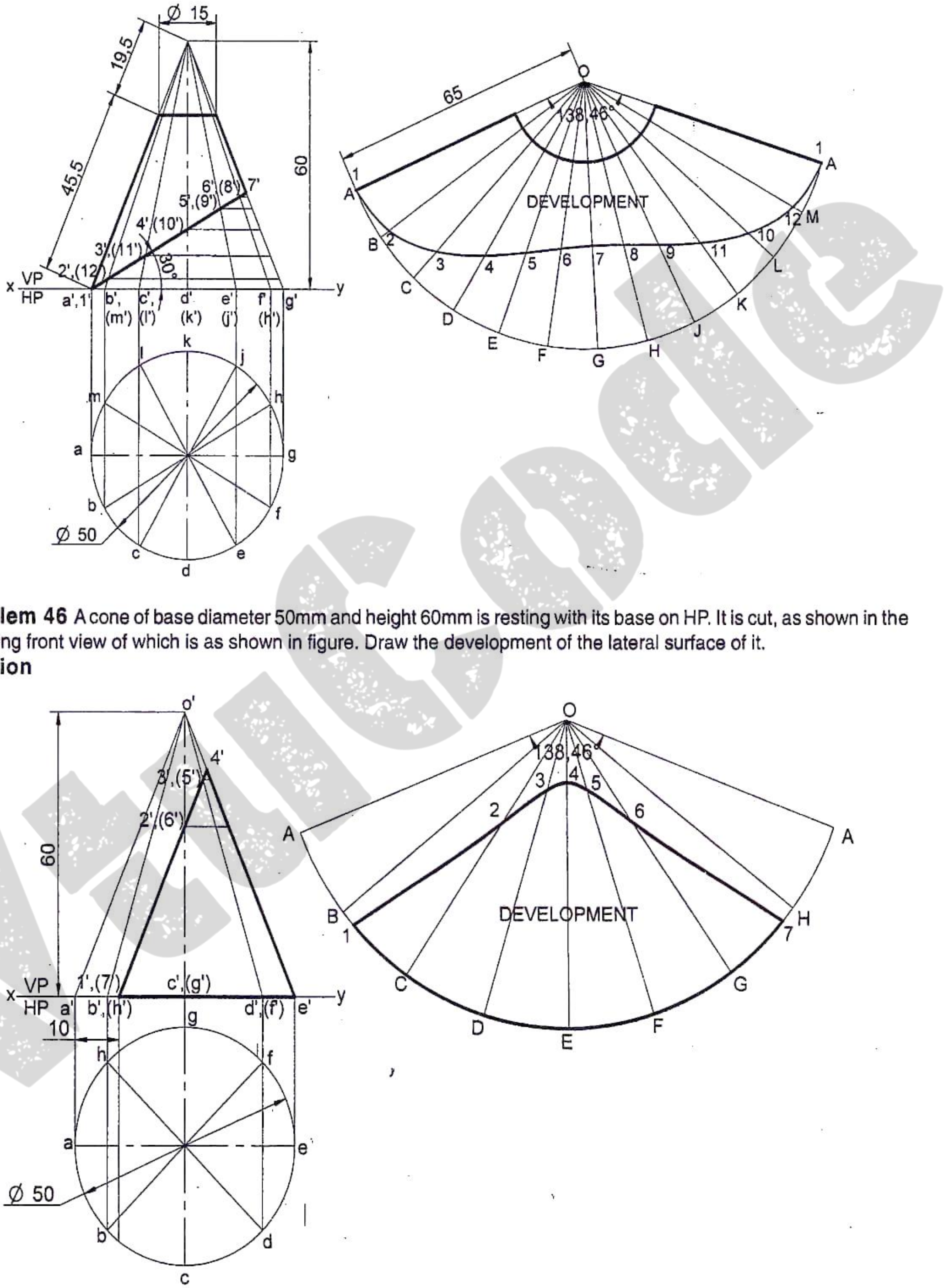
Problem 44 Develop the lateral surface of the cylinder of 40mm diameter and height 60mm which is cut in the following way.

Solution



Problem 45 Draw the development of the lateral surface of the cone, whose front view is as shown in the following figure.

Solution

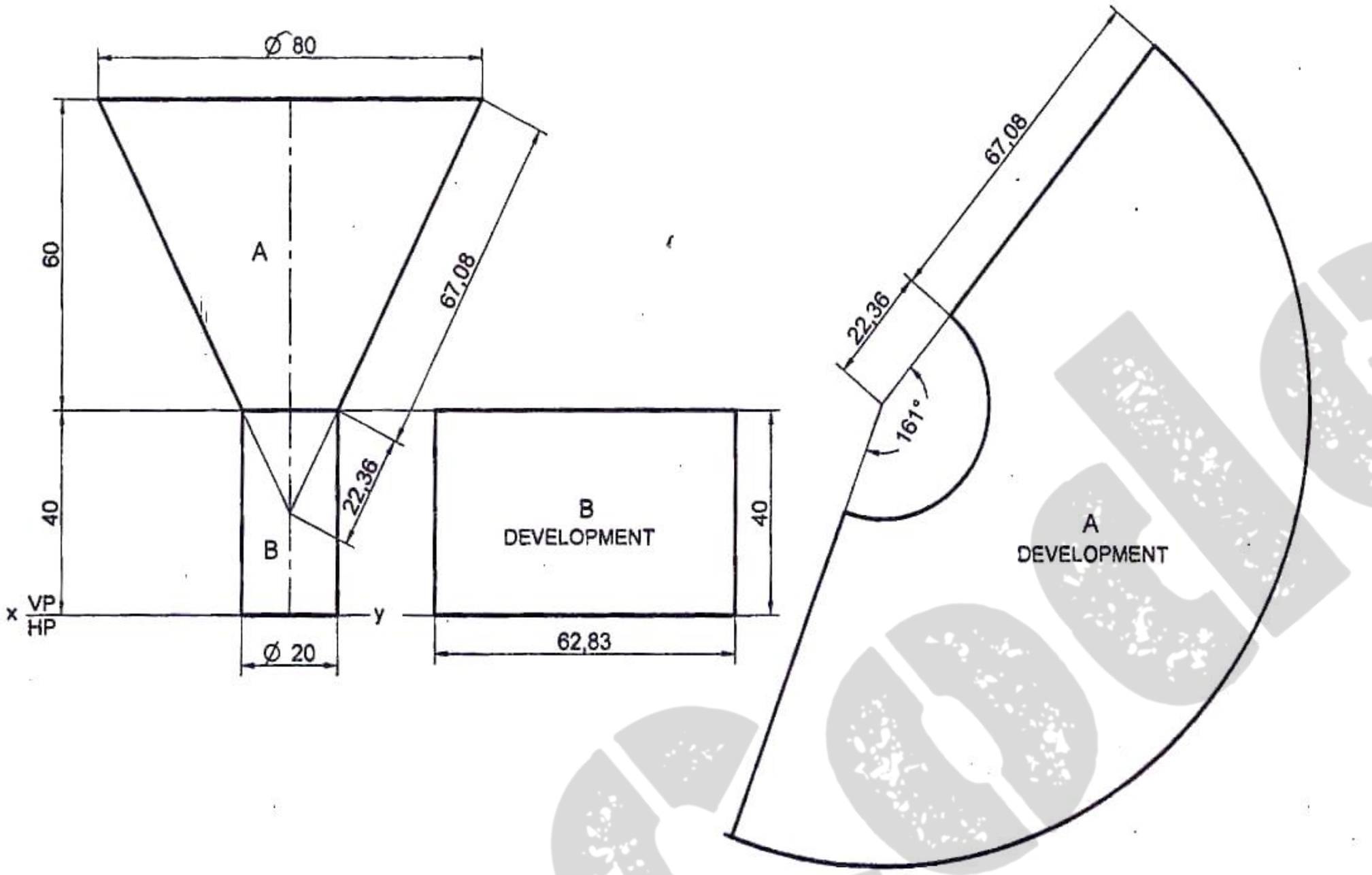


Problem 46 A cone of base diameter 50mm and height 60mm is resting with its base on HP. It is cut, as shown in the following front view of which is as shown in figure. Draw the development of the lateral surface of it.

Solution

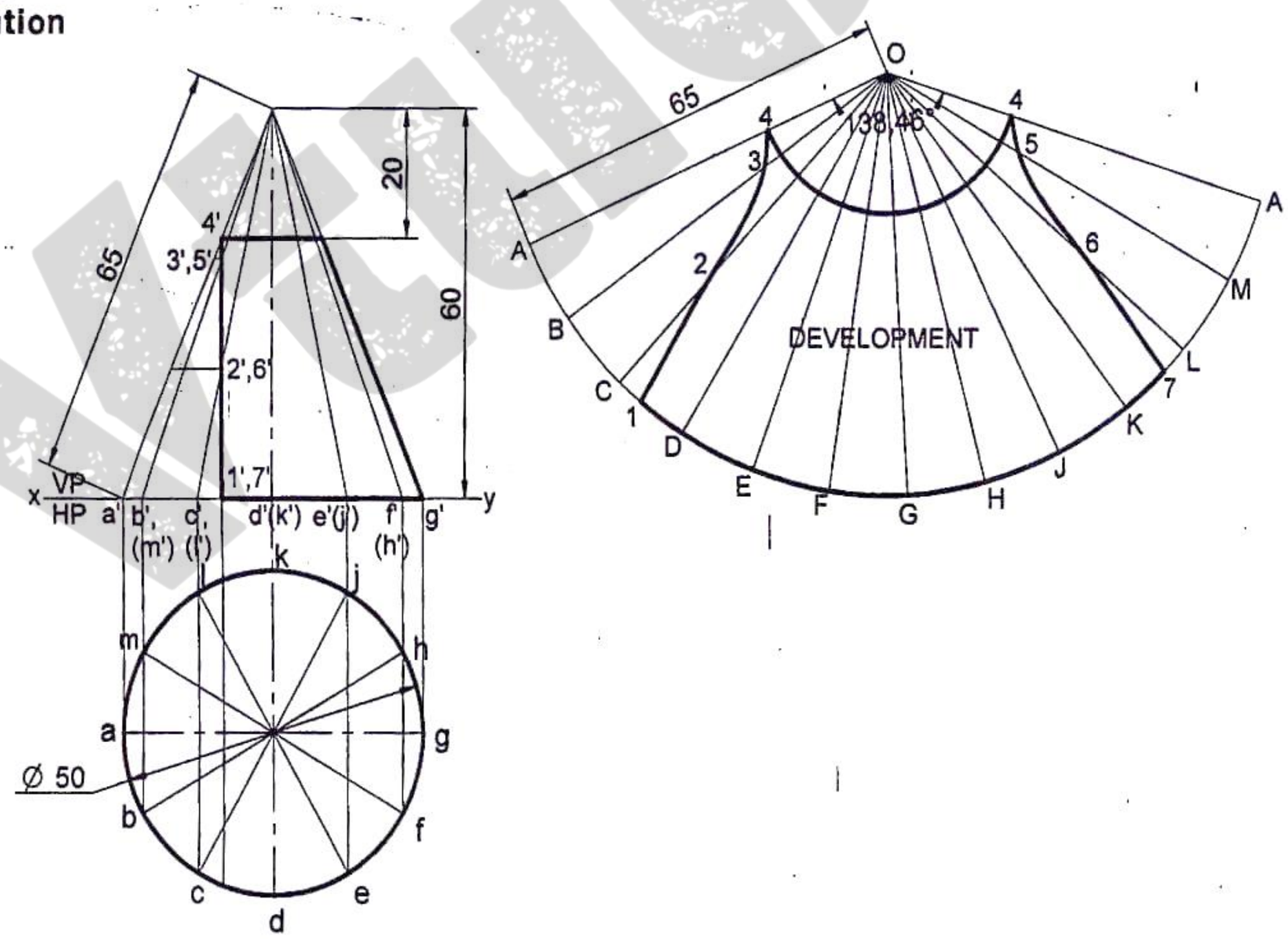
Problem 47 Draw the development of the lateral surface of a funnel consisting of a cylinder and a frustum of a cone. The diameter of the cylinder is 20mm and top face diameter of the funnel is 80mm. The height of frustum and cylinder are equal to 60mm and 40mm respectively.

Solution



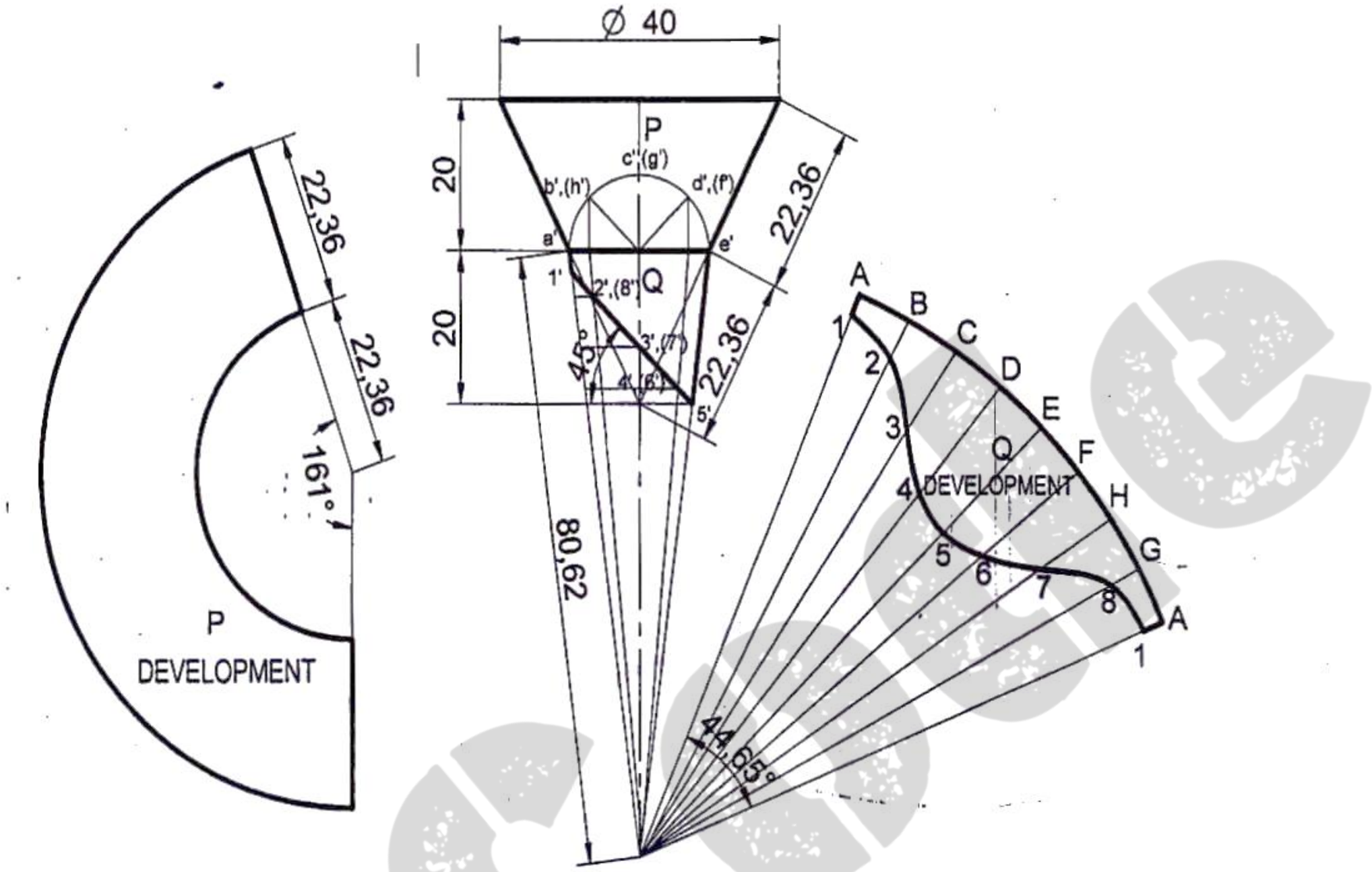
Problem 48 Draw the development of the lateral surface of the cut cone, whose front view is shown in the following figure.

Solution



Problem 49 A funnel is to be made of sheet metal. The funnel tapers from 40 mm to 20 mm diameter to a height of 20 mm and from 20 mm to 15 mm diameter, for the next 20 mm height. The bottom of the funnel is beveled off to a plane inclined at 45° to the axis. Draw the development of the funnel.

Solution



Problem 50 A funnel is made of sheet metal. The funnel tapers from 60 mm. to 30 mm. diameters to a height of 25 mm. and then forms to a cylinder with a height of 50 mm. Bottom of funnel Is beveled off completely at an angle of 45° to axis Draw the development of funnel.

Solution