

19-7-1. VISUAL-RAY METHOD

This method is explained by means of the following three illustrative problems:

Problem 19-1. (fig. 19-5): A point A is situated 15 mm behind the picture plane and 10 mm above the ground plane. The station point S is 25 mm in front of the picture plane, 20 mm above the ground plane and lies in a central plane 10 mm to the right of the point. Draw the perspective view of the point A .

The pictorial view of the ground plane, the picture plane, the given point and the station point in their respective positions is given in fig. 19-5(i). The visual ray AS from the station point S to the point A is also shown. It passes through the picture plane. To mark the perspective of A , the point A' at which AS pierces the picture plane should be located.

In fig. 19-5(ii), an auxiliary ground plane (AGP) is shown placed above the point A , and the visual ray AS is shown projected on it, as is the top view of AS and a_1 is the top view of the point A' at which AS pierces the picture plane. a_1 shows the position of the point A' along the length of the picture plane. When the auxiliary ground plane is revolved and brought in the same plane as that of the picture plane, the view will be as shown in fig. 19-5(iii).

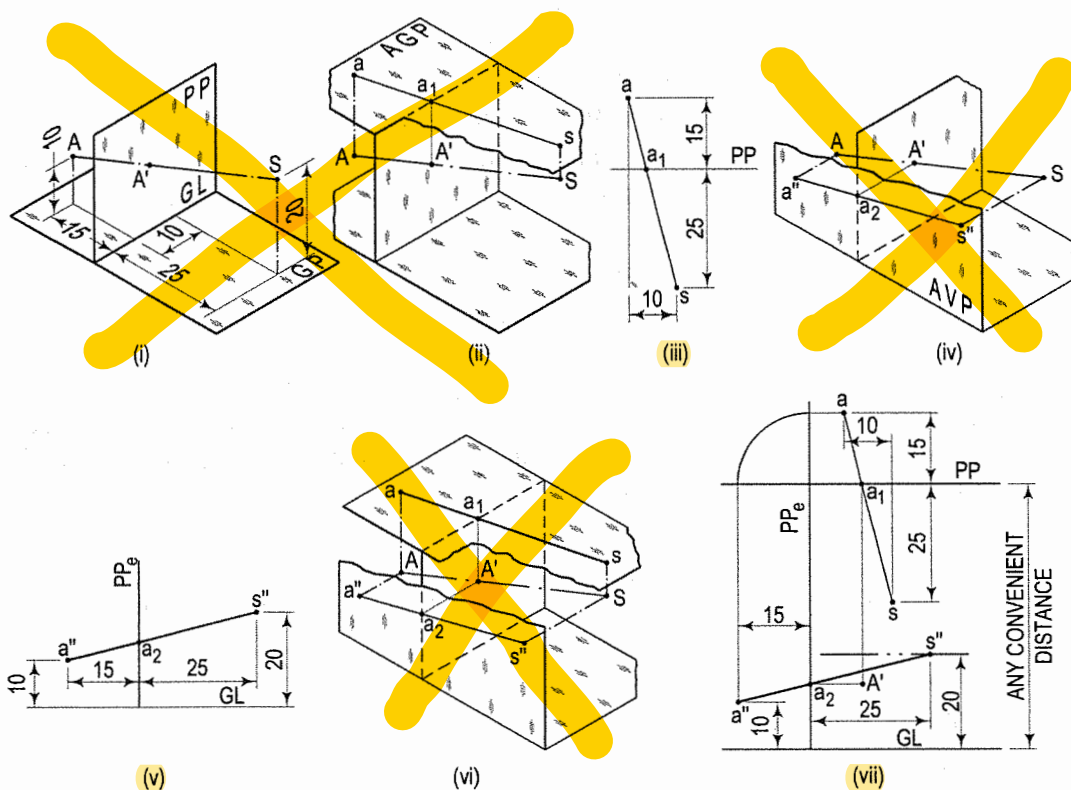


FIG. 19-5

To obtain the height of A' above the ground plane, an auxiliary vertical plane (AVP) perpendicular to both the picture plane and the ground plane is placed to the left of A and the side view of AS is projected on it [fig. 19-5(iv)]. $a''s''$ is the side

- (ii) Draw a vertical line through m , the mid-point of ab and on it mark s , the top view of the station point, 50 mm below PP.
- (iii) Draw lines joining s with a and b , and intersecting PP at points a_1 and b_1 respectively.
- (iv) Draw the ground line GL at any convenient distance below PP. Draw the horizon line HL parallel to and 40 mm above GL. Project s' , the front view on HL.
- (v) From ab , project the front view $a'b'$, parallel to and 15 mm above GL. Draw lines joining s' with a' and b' .
- (vi) Through a_1 and b_1 , draw verticals to intersect $a's'$ and $b's'$ at points A' and B' respectively.
- (vii) Join A' with B' . Then $A'B'$ is the required perspective view of AB .

The perspective can also be obtained with the aid of the side view instead of the front view. Perspective view of any solid (by visual-ray method) can similarly be drawn by first obtaining the perspective of each corner and then joining them in correct sequence, taking care to show the hidden edges by dashed lines.

Problem 19-3. (fig. 19-8 and fig. 19-9): A rectangular pyramid, base $30\text{ mm} \times 20\text{ mm}$ and axis 35 mm long, is placed on the ground plane on its base, with the longer edge of the base parallel to and 30 mm behind the picture plane. The central plane is 30 mm to the left of the apex and the station point is 50 mm in front of the picture plane and 25 mm above the ground plane. Draw the perspective view of the pyramid.

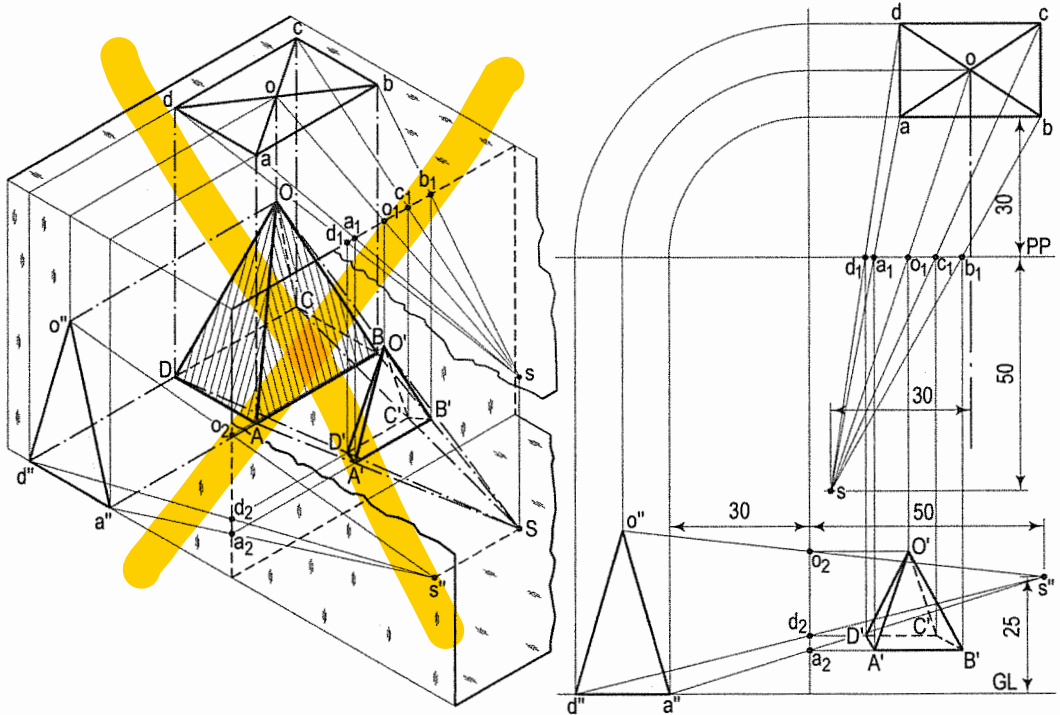


FIG. 19-8

Fig. 19-8 shows the perspective view of the pyramid obtained by means of its top view and the side view. The pictorial view shows clearly that points on the perspective lie in the picture plane on respective visual rays.

In fig. 19-9, the perspective view is drawn by means of its top view and the front view. It partly overlaps the front view.

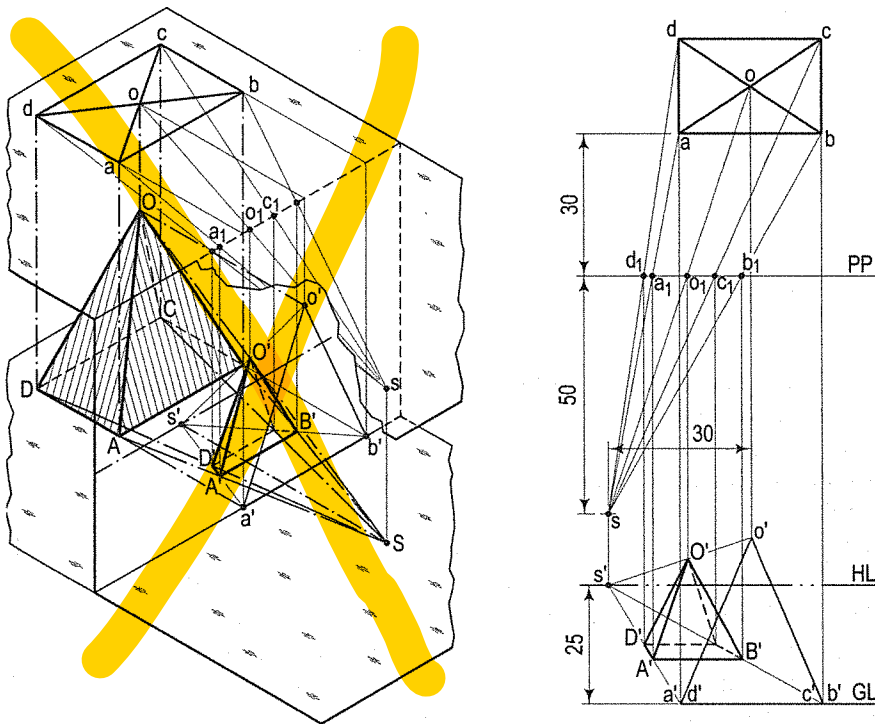


FIG. 19-9

19-7-2. VANISHING-POINT METHOD

Vanishing points: These are imaginary points infinite distance away from the station point. In practice, the point at which the visual ray from the eye to that infinitely distant vanishing point pierces the picture plane is referred to as the vanishing point.

If we stand between the rails of a long straight stretch of a railway track, it would appear as if the rails meet very far away at a point just at the level of the eye, i.e. on the horizon line. Even the telegraph and telephone wires running along the track at the sides of the track appear to meet at the same point. This point is a vanishing point.

In fig. 19-10, ab is the top view of a line AB lying on the ground plane and inclined at angle θ to the picture plane. When viewed from the station point s , its intercept on PP is a_1b_1 .

If the line is moved along the ground to the right, keeping the same inclination θ with the picture plane, its intercept will go on decreasing. The intercept becomes zero, or the line vanishes in a point at v when ab and the visual ray fall in a straight line. The point v is the top view position of the vanishing point for the horizontal line AB and for all lines parallel to AB , irrespective of their positions. The front-view position V of the vanishing point is obtained by projecting v , vertically on the horizon line.

Therefore, the vanishing point for any horizontal line is found by drawing a line parallel to the top view of that line from the top view of the station point. The point at which this line intersects the top view of the picture plane is then projected

Fig. 19-13 shows the perspective view of a hut having its front face in the picture plane. The front face is seen in its true size and shape, while the back parallel face is of the same shape but reduced in size. As the lines AF , BG , CH , DJ and EK are perpendicular to the picture plane, their perspectives $A'F'$, $B'G'$ etc. converge to the centre of vision c' on HL . Note that vertical lines AE , CD etc. remain vertical in perspective. Similarly, horizontal lines ED and KJ , and sloping lines AB , BC , FG and GH (which are all parallel to the picture plane) remain respectively horizontal and sloping in perspective.

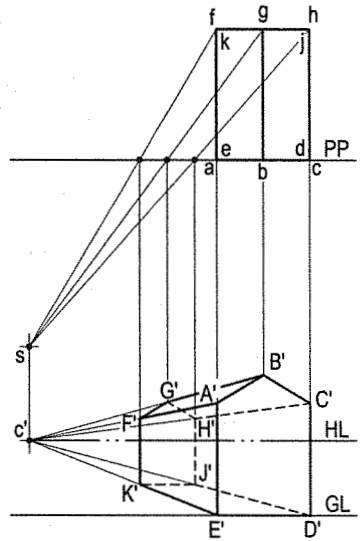


FIG. 19-13

Consider $ab = bc = 50\text{ mm}$
 $Ae = cd = ke = 100\text{ mm}$
 $HL = 75\text{ mm}$
 S point from $PP = 125\text{ mm}$

This book is accompanied by a computer CD, which contains an audiovisual animation presented for better visualization and understanding of the subject. Readers are requested to refer Presentation module 47 for the angular or two point perspective.

(2) **Angular perspective or two point perspective:** When an object has its two faces inclined to the picture plane, its perspective is called *angular perspective* also called *two point perspective* as the edges of the object converge to two vanishing points.

Problem 19-4. (fig. 19-14): A rectangular block, $30\text{ mm} \times 20\text{ mm} \times 15\text{ mm}$, is lying on the ground plane on one of its largest faces. A vertical edge is in the picture plane and the longer face containing that edge makes an angle of 30° with the picture plane.

The station point is 50 mm in front of the picture plane, 30 mm above the ground plane and lies in a central plane which passes through the centre of the block. Draw the perspective view of the block.

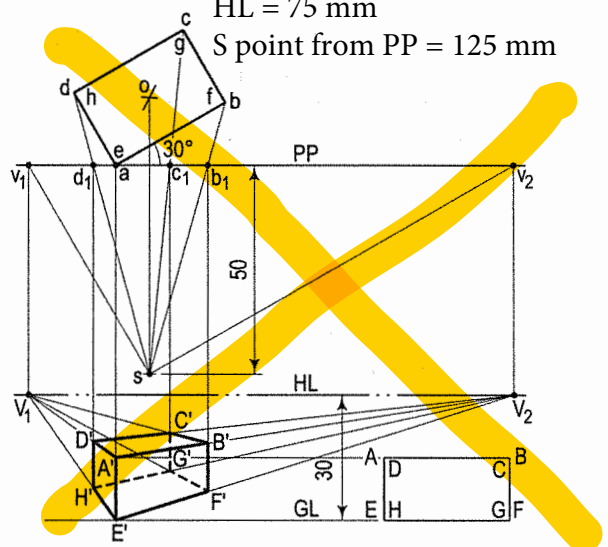


FIG. 19-14

- Draw the top view $abcd$ with a in PP and the longer edge ab inclined at 30° to PP . Mark its centre o . Mark s , the top view of the station point, on a vertical line through o and 50 mm below PP .
- Draw lines joining s with corners b , c and d , and intersecting PP at points b_1 , c_1 and d_1 .
- Draw the ground line GL at any distance below PP and the horizon line HL , 30 mm above GL .

Problem 14-9. (fig. 14-10): A pentagonal pyramid, base 30 mm side and axis 65 mm long, has its base horizontal and an edge of the base parallel to the V.P. A horizontal section plane cuts it at a distance of 25 mm above the base. Draw its front view and sectional top view.

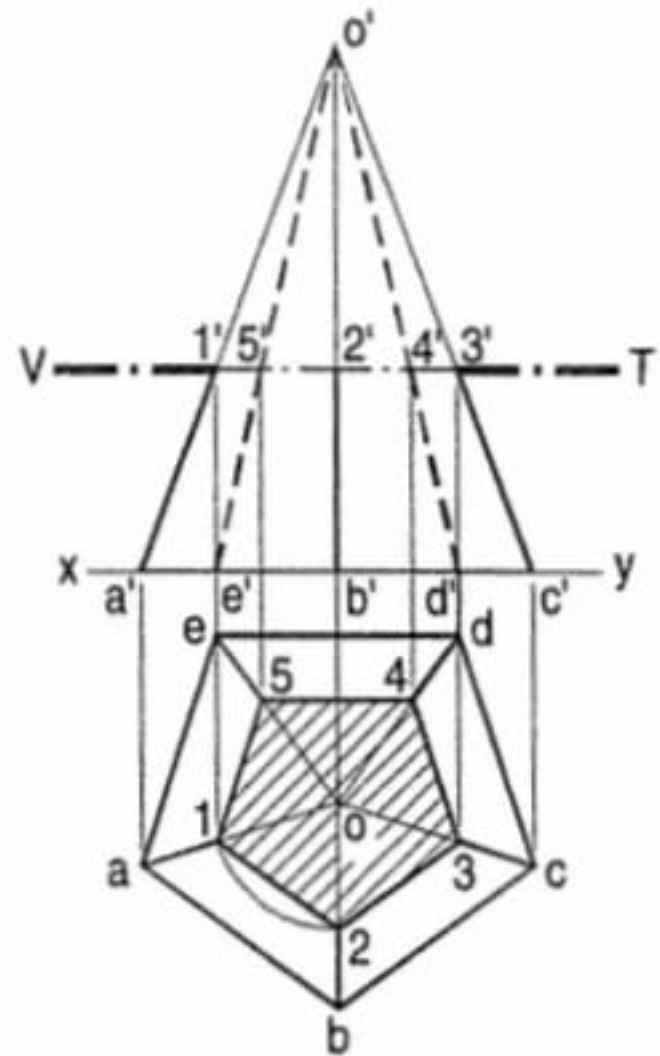
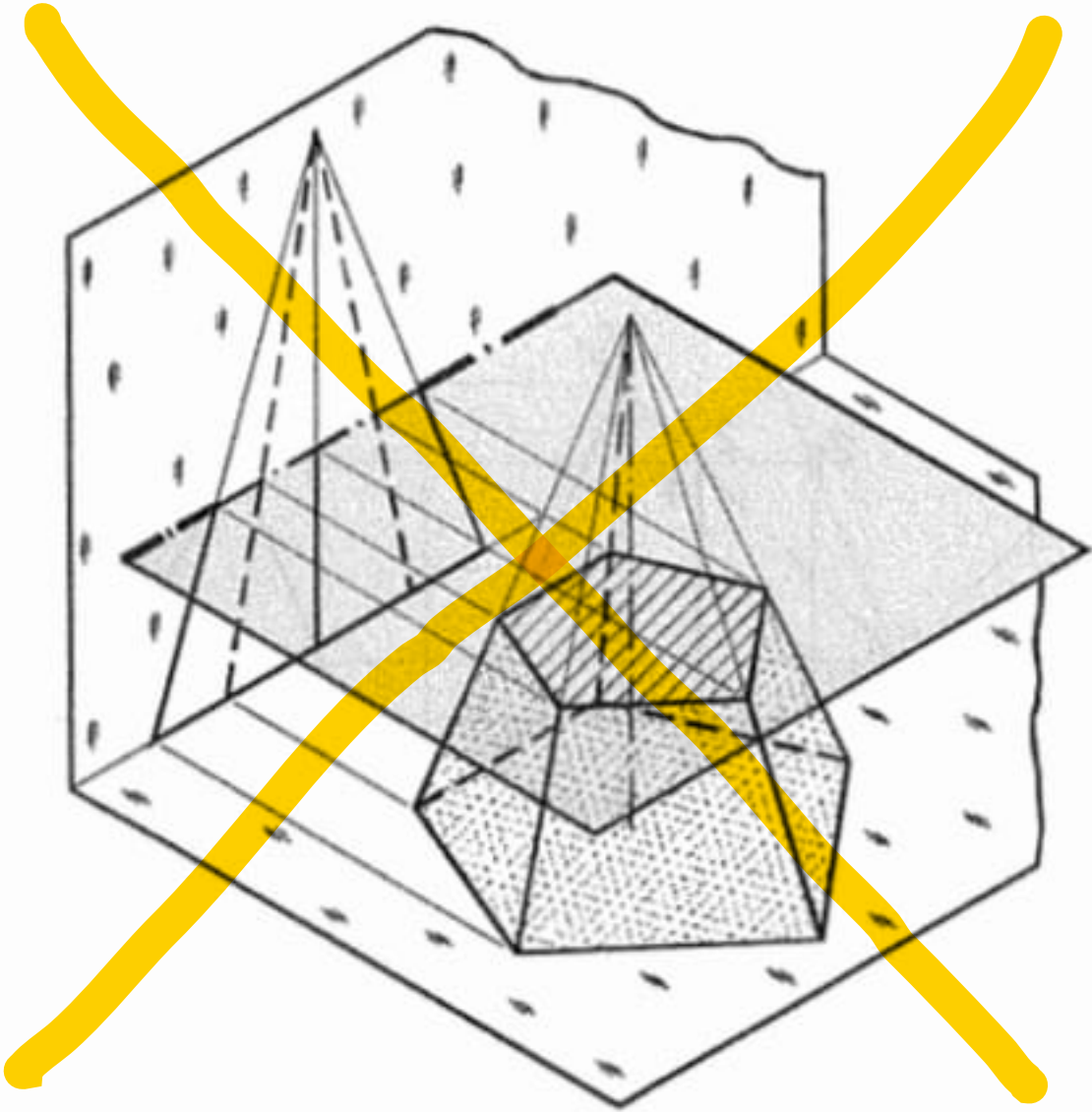


FIG. 14-10

Problem 14-28. (fig. 14-31): A cone, base 70 mm diameter, axis 75 mm long and resting on its base on the H.P., is cut by a vertical section plane, the H.T. of which makes an angle of 60° with the reference line and is 12 mm away from the top view of the axis. (i) Draw the sectional front view and the true shape of the section. (ii) Also draw the sectional front view and the top view when the same section plane is parallel to the V.P.

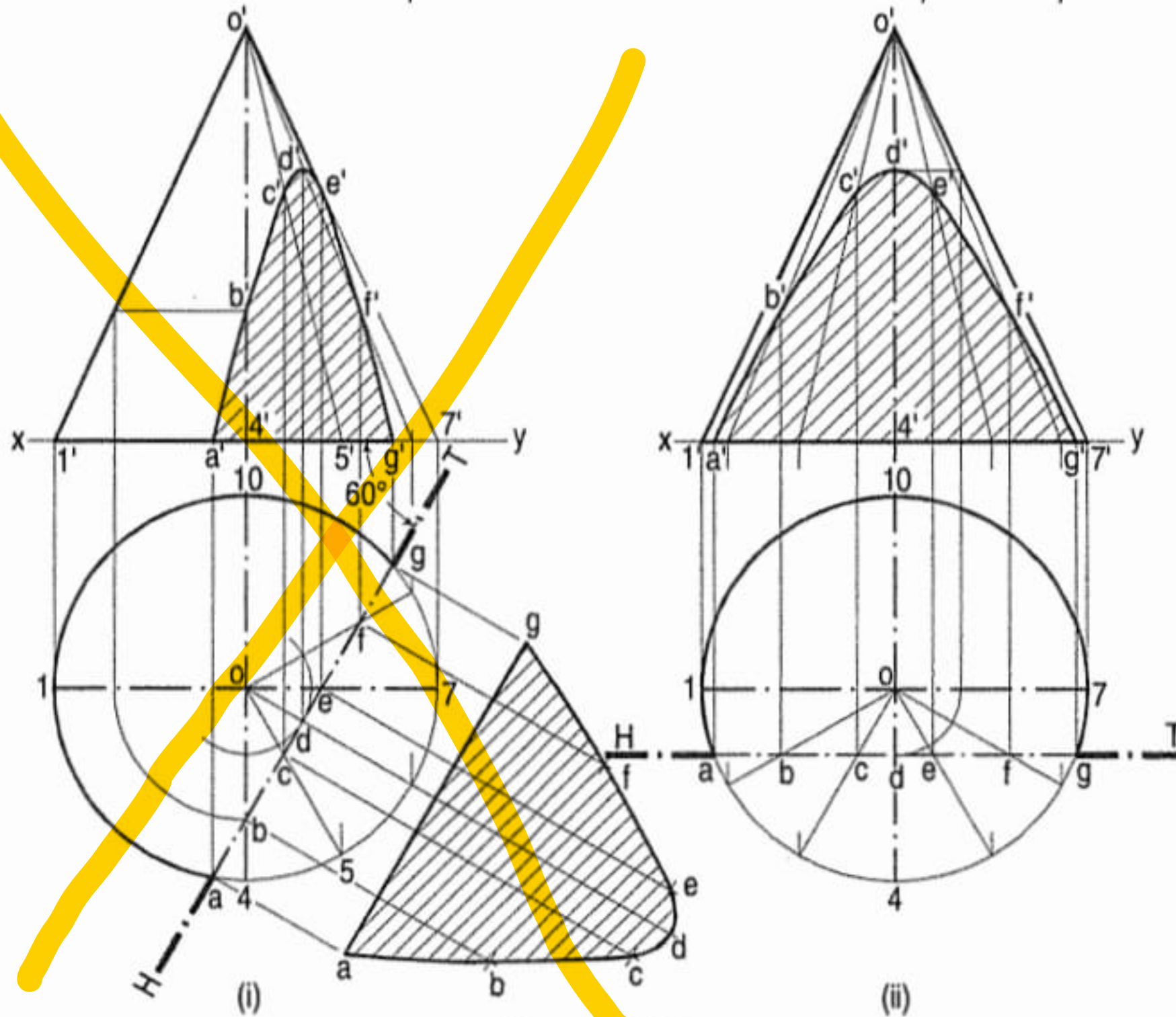


FIG. 14-31