DEPARTMENT OF MECHANICAL ENGINEERING
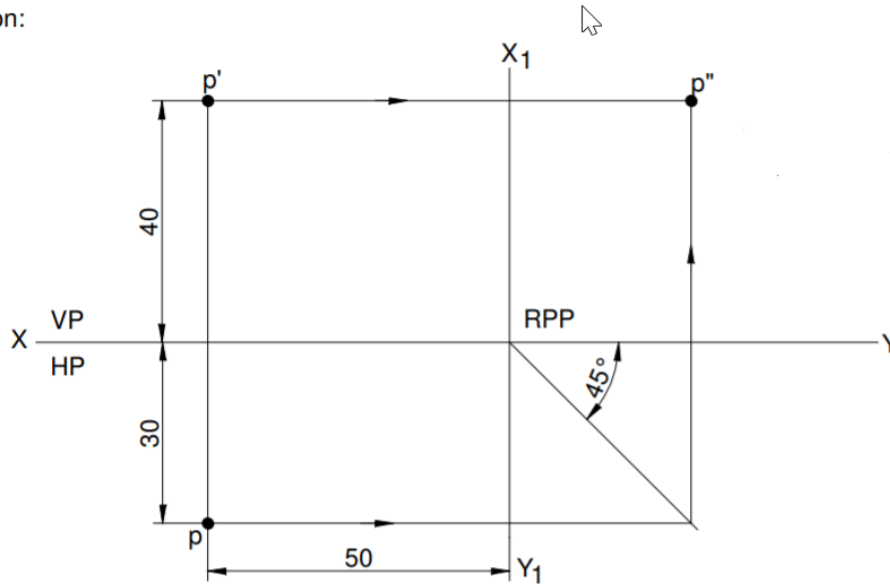
COMPUTER AIDED ENGINEERING DRAWING [ME19/ME29]

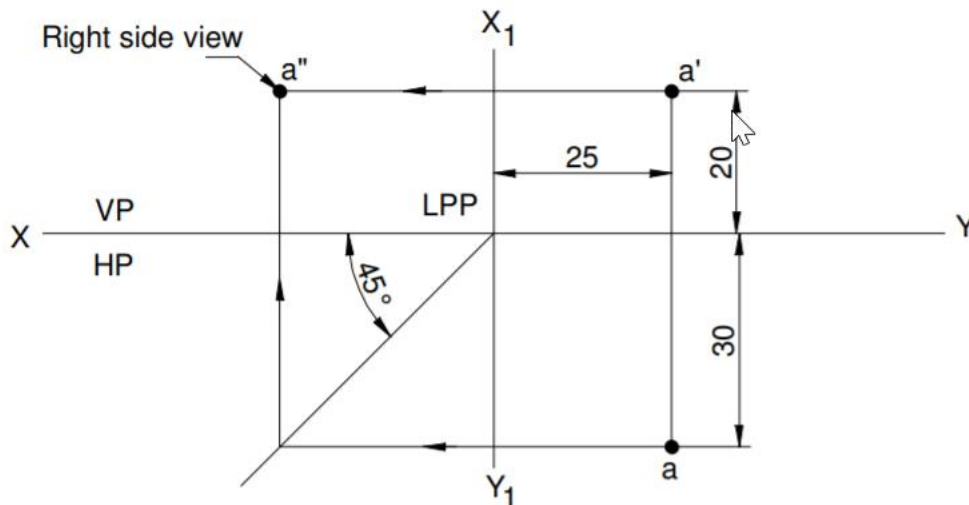# PROJECTION OF POINTS

1. A point P is 30 mm infront of VP, 40 mm above HP and 50 mm from RPP. Draw its projections
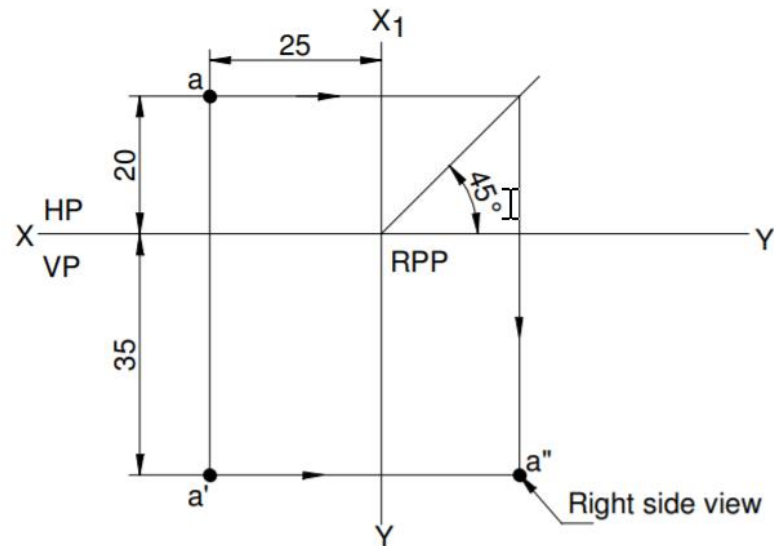
Solution:

2. A point is 30 mm infront of VP, 20 mm above HP and 25 mm infront / behind / from LPP. Draw its projects and name the side view.
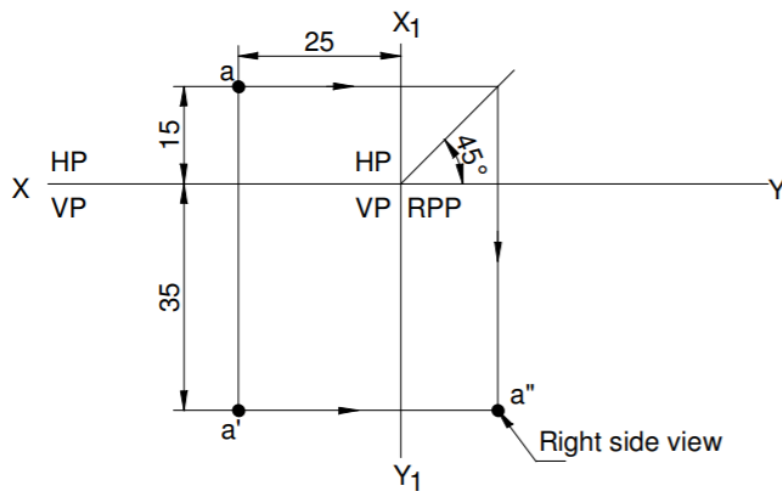
3. A point is 35 mm below HP, 20 mm behind VP and 25 mm behind / infront / from RPP. Draw its projections and name the side view.
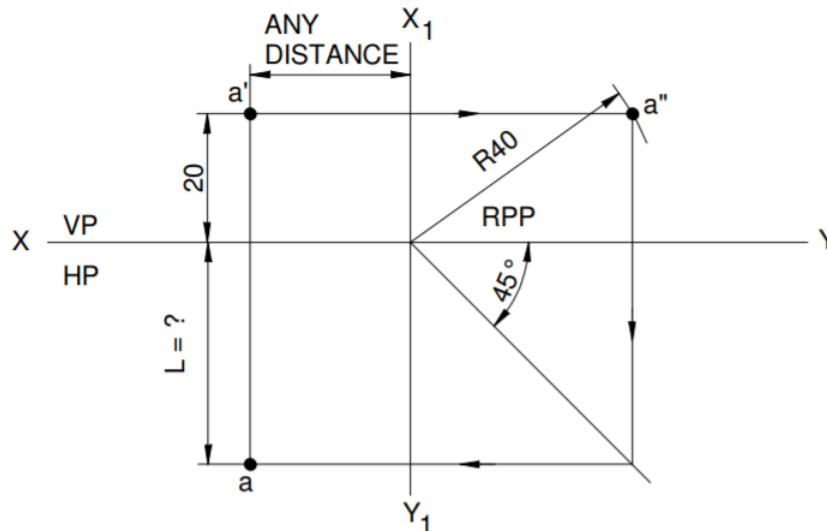
Solution:

4. A point is 35 mm below HP, 15 mm behind VP and 25 mm behind / infront / from RPP. Draw its projections and name the side view.

Solution:

5. Point A is 20 mm above HP and in the 1st quadrant. Its shortest distances from the XY line is 40 mm. Draw the projections determine its distance from VP.
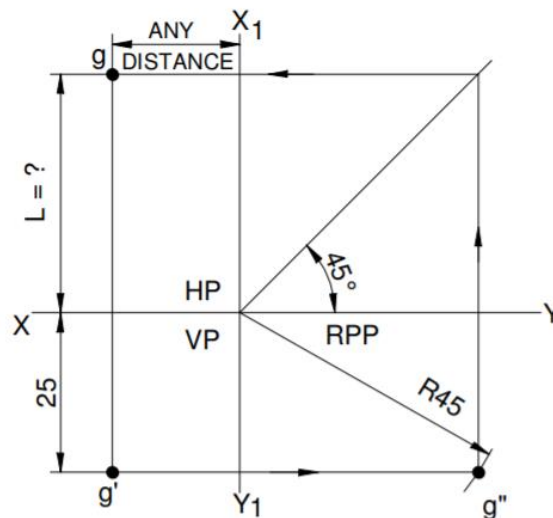
Solution:

ANSWERS

L = 34.64 mm
Point A is 34.64 mm infront of VP.

6. A point G is 25 mm below HP and is situtated in the third quadrant. Its shortest distance from the intersection of XY and X1Y1 is 45 mm. Drawits projection and find its distance from VP.
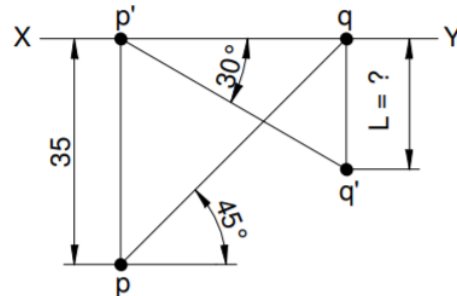
Solution:

ANSWERS

L = 37.42 mm
Point G is 37.42 mm behind VP

7. A point P is on HP and 35 mm infront of VP. Another point Q is on VP and below HP. The line joining their front views makes an angle of 30 deg. to XY line, while the line joining their top views makes an angle of 45 deg. with XY line. Find the distance of the point Q from HP.
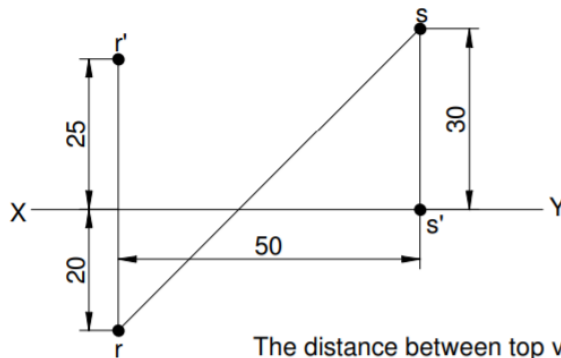
Solution:

ANSWERS

L = 20.21 mm

Q is 20.21 mm below HP

8. A point R is 25 mm above HP and 20 mm infront of VP. Another point S is on HP and 30 mm behind VP. The distance between their projectors measured parallel to the line of intersection VP and HP is 50 mm. Find the distance between top views of points R and S.
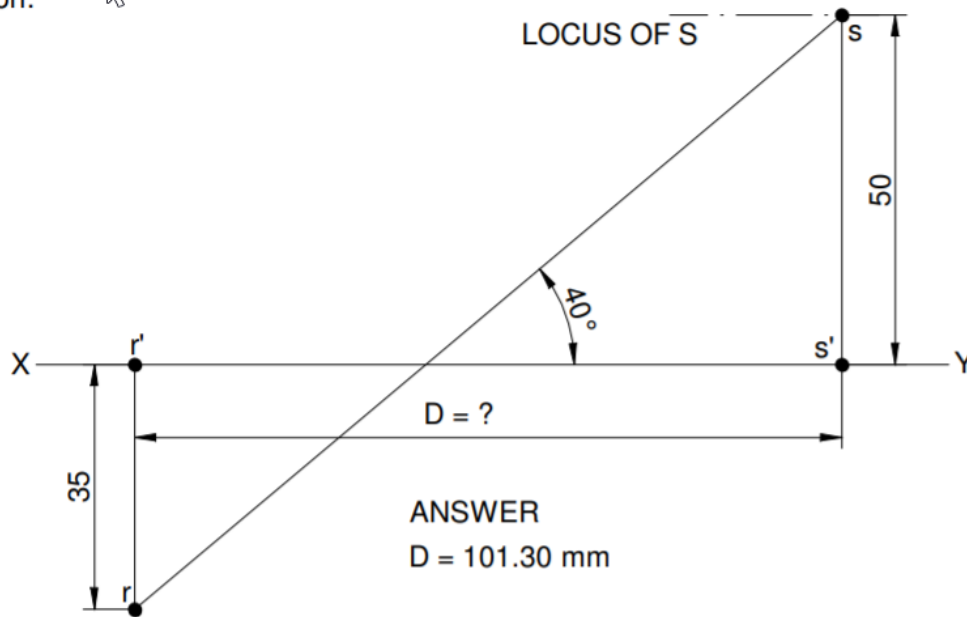
Solution:

The distance between top views of points R and S is 70.71 mm

9. Two points R and S are on HP. The point R is 35 mm infront of VP, while S is 50 mm behind VP. The line joining their top views makes an angle of 40 deg. with XY. Find the horizontal distance between the two projectors.

Solution:

LOCUS OF S

40°

50

X ——— r' ——— S' ——— Y

D = ?

35

ANSWER

D = 101.30 mm

10. Two points P and Q are on HP. The point P is 30 mm behind VP, while Q is 50 mm infront of VP. The line joining their top views makes an angle of 40 deg. with XY. Find the horizontal distance between their projectors parallel to XY line.

Solution:

p

30

X ——— p' ——— q' ——— Y

D = ?   40°

50

ANSWER

D = 95.34 mm

LOCUS OF Q   q
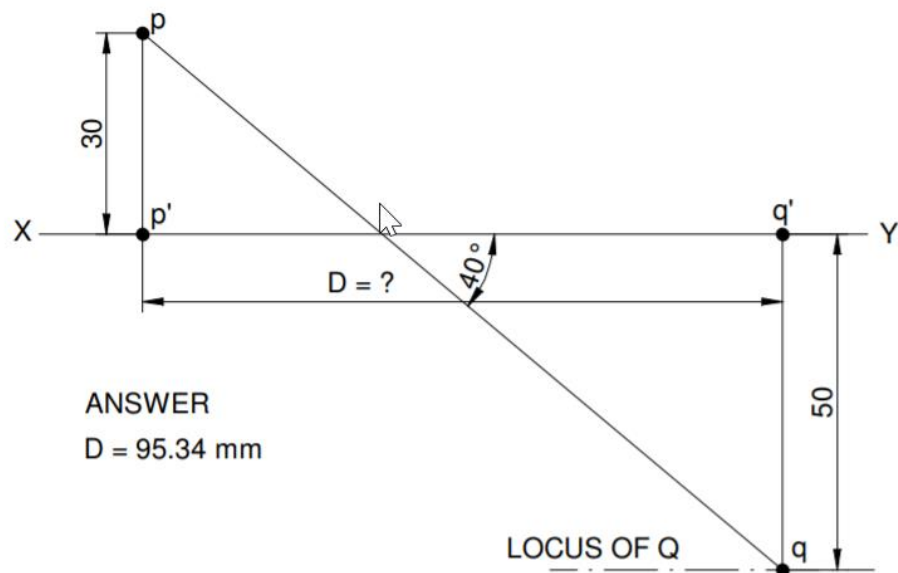
PROJECTION OF LINES

1.A line AB 80 mm long has its end A 20 mm above HP and 30 mm infront of VP. It is inclined at 30 deg. to HP and 45 deg. to VP. Draw the projections of the line and find apparent lengths and apparent inclinations.

Solution:

Data Given
- True Length = AB = 80mm is inclined at
30 deg. to HP and 45 deg. to VP
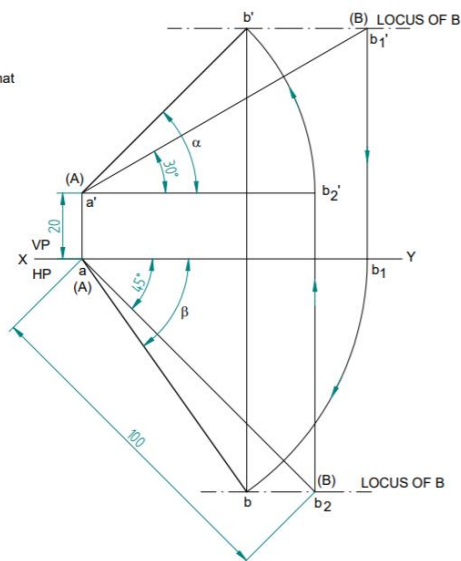- End A 20 mm above HP and 30 mm
infront of VP
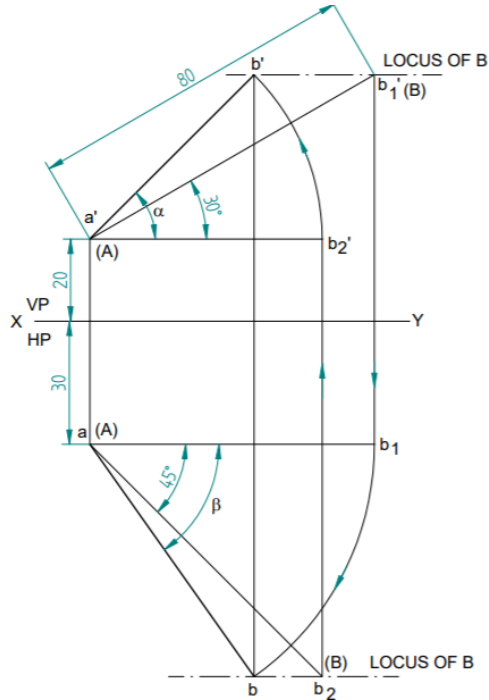
ANSWERS

α = 45°
β = 54.74°
a'b' = 56.57 mm
ab = 69.28 mm

2.Draw the projections of a line AB 100 mm long inclined at 45 deg. to VP and 30 deg. to HP. One end of the line is 20 mm above HP and in VP. Determine apparent lengths and inclinations.

Solution:

Data Given
Problem Similar to Problem 1, except that
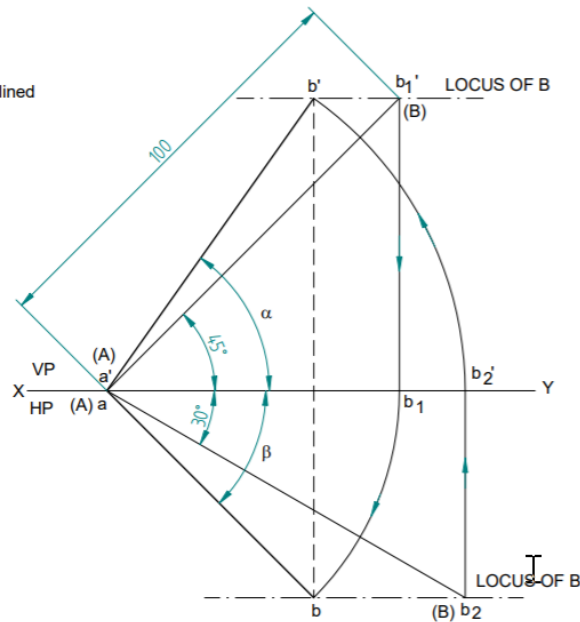one end of the line is in VP

ANSWERS

α = 45.00°
β = 54.74°
a'b' = 70.71 mm
ab = 86.60 mm

3.A line AB 100 mm long is inclined to HP at 45 deg. and inclined to VP at 30 deg point A lies on both HP & VP. Draw front and top views of line and determine their lengths. Also determine the distance of end B from both HP and VP

Solution:

Data Given
- True Length = AB = 100mm is inclined
at 45deg. to HP and 30deg. to VP

ANSWERS

α = 54.74°	
β = 45.00°	
a'b' = 86.60 mm	
ab = 70.71 mm	
Perpendicular distance of end B from HP	$b_1'b_1$ = 70.71 mm
Perpendicular distance of end B from VP	$b_2'b_2$ = 50.00 mm

4.A straight line PQ, 65 mm long, is inclined at 45 deg. to HP and 30 deg. to VP. The point P is 70 mm from both the reference planes and point Q is towards the reference planes. Draw the projections.

Solution:
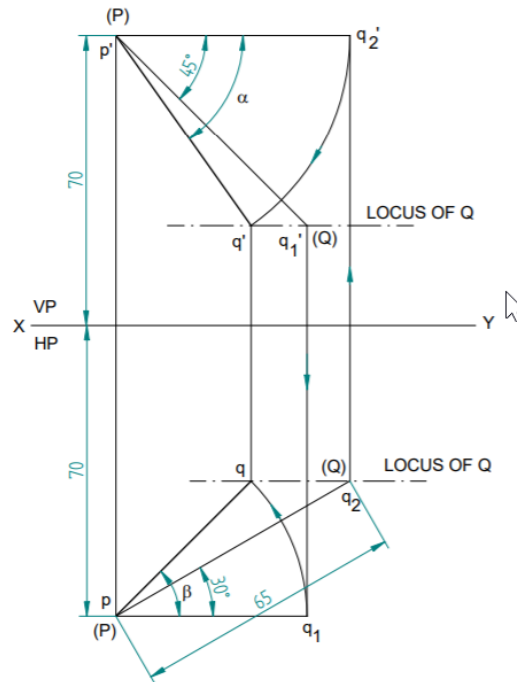
ANSWERS

α = 54.74°	
β = 45.00°	

5.A line AB measuring 70 mm has its end A 15 mm infront of VP and 20 mm above HP and the other end B 60 mm infront of VP and 50 mm above HP. Draw the projections of the line and find the inclinations of the line with the both the reference planes of projection.
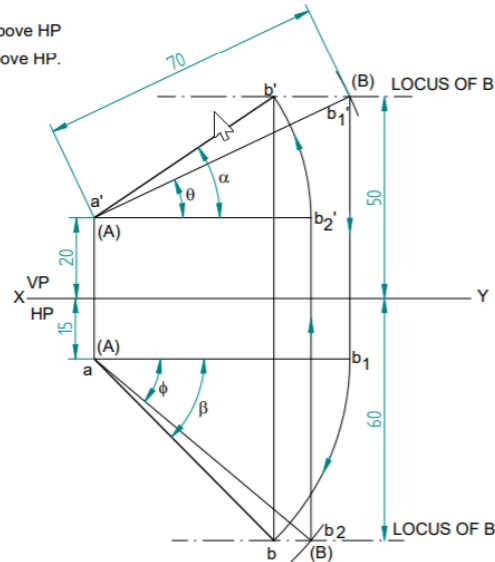
Solution:

Data Given

True Length = AB = 70 mm

End A 15 mm infront of VP and 20 mm above HP

End B 60 mm infront of VP and 50 mm above HP.

ANSWERS

α = 34.02°
θ = 25.38°
ϕ = 40.01°
β = 45.36°

6.A line AB 65 mm long, has its end A 20 mm above HP and 25 mm infront of VP. The end B is 40 mm above HP and 65 mm infront of VP. Draw the projections of AB and show its inclination with HP and VP.
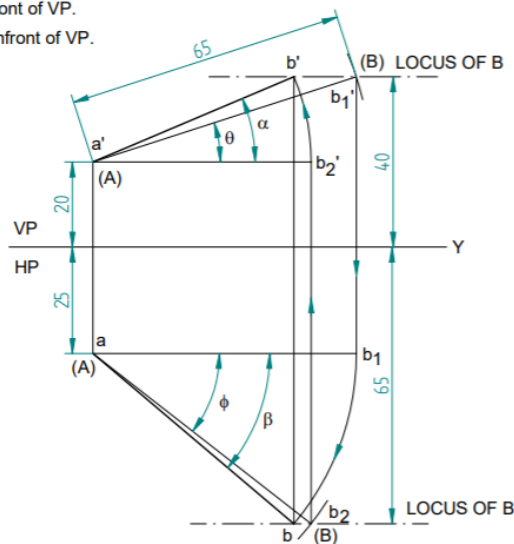
Solution:

Data Given

True Length = AB 65 mm

End A 20 mm above HP and 25 mm infront of VP.

End B is 40 mm above HP and 65 mm infront of VP.

ANSWERS

α = 22.98°
θ = 17.92°
ϕ = 37.98°
β = 40.30°

7.A line AB has its end A 20 mm above HP and 30 mm infront of VP. The other end B is 60 mm above HP and 45 mm infront of VP. The distance between end projectors is 70 mm. Draw its projections. Determine the true length and apparent inclinations
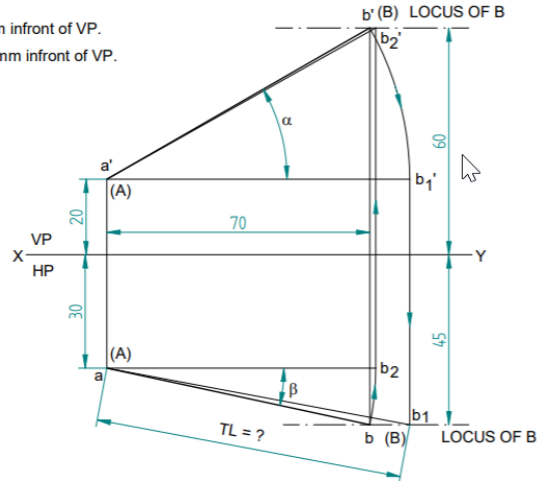
Solution:

Data Given
Line AB
End A 20 mm above HP and 30 mm infront of VP.
End B is 60 mm above HP and 45 mm infront of VP.
DBEP = 70 mm.

ANSWERS

TL = 82.01 mm	
α = 29.74°	
β= 12.09°	

8.The end A of a line AB is on HP and 25 mm infront of VP. The end B is on VP and 50 mm above HP. The distance between the end projectors when measured parallel to the line of intersection of HP and VP is 65 mm. Draw the projections of the line AB and determine its true length and true inclinations with HP and VP
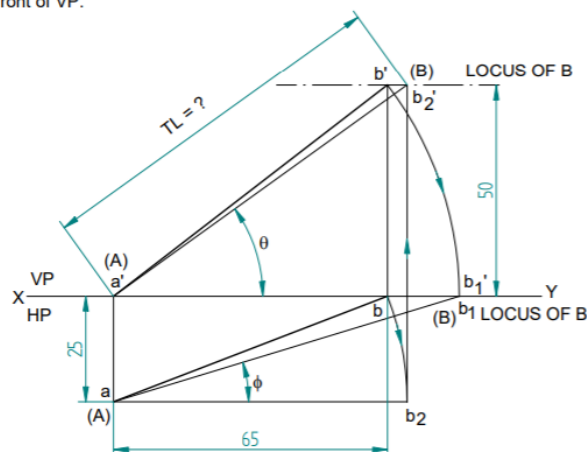
Solution:
Data Given
Line AB
End A of a line AB is on HP and 25 mm infront of VP.
End B is on VP and 50 mm above HP.
DBEP = 65 mm

ANSWERS

θ = 35.68°	
φ = 16.95°	
TL = 85.73mm	

9. The end A of a line AB is in HP and 25 mm infront of VP. The end B is 10 mm infront of VP and 50 mm above HP. The distance between the end projectors when measured parallel to the line of intersection of HP and VP is 80 mm. Draw the projections of the line AB and determine its true length and true inclinations with HP and VP.
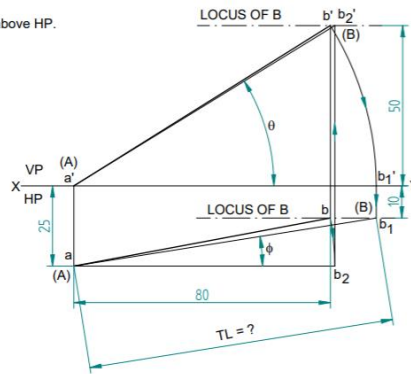
Solution:
Data Given
Line AB
End A is in HP and 25 mm infront of VP.
End B is 10 mm infront of VP and 50 mm above HP.
DBEP 80 mm

ANSWERS

TL = 95.52mm	
θ = 31.56°	
φ = 9.03°	

10. A line PQ 85 mm long has its end P 10 mm above HP and 15 mm infront of VP. The top view and front view of line PQ are 75 mm and 80 mm respectively. Draw its projections. Also determine the true and apparent inclinations of the line.
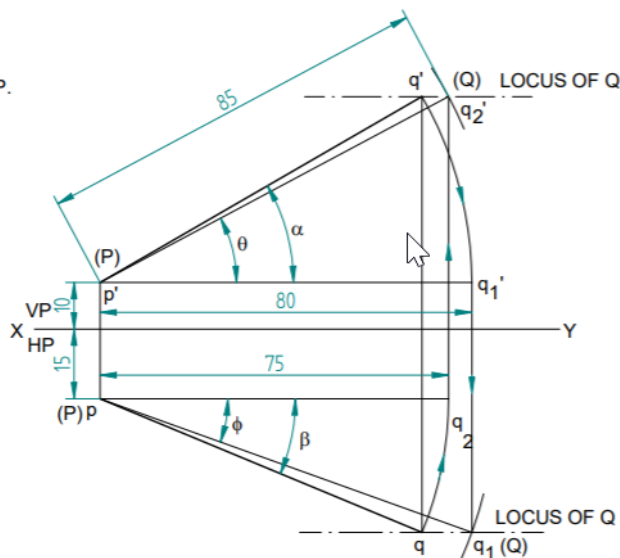
Solution:
Data Given
True Length = PQ = 85 mm
End P 10 mm above HP and 15 mm infront of VP.
Apparent length in top view = p'q'= 75 mm
Apparent length in front view = pq = 80 mm

ANSWERS

|	
θ = 28.07°	
α = 30.00°	
φ = 19.75°	
β = 22.52°	

# PROJECTION OF LAMINA'S[PLANE SURFACES]

1. An isosceles triangular plate of negligible thickness has base 25 mm long and altitude 35 mm it is placed on HP such that in the front view is seen as an equilateral triangle of 25 mm sides with the side that is parallel to VP is inclined at 45 deg. to HP. Draw its top and front views. Also determine the inclination of the plate with the reference plane.
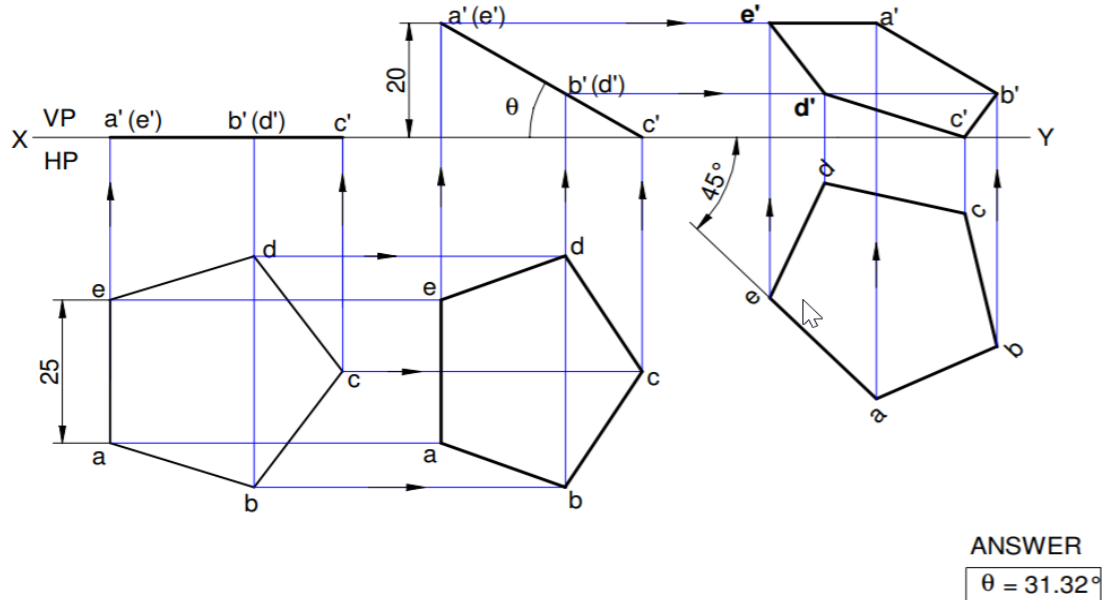
Solution:

$\phi = 51.79°$
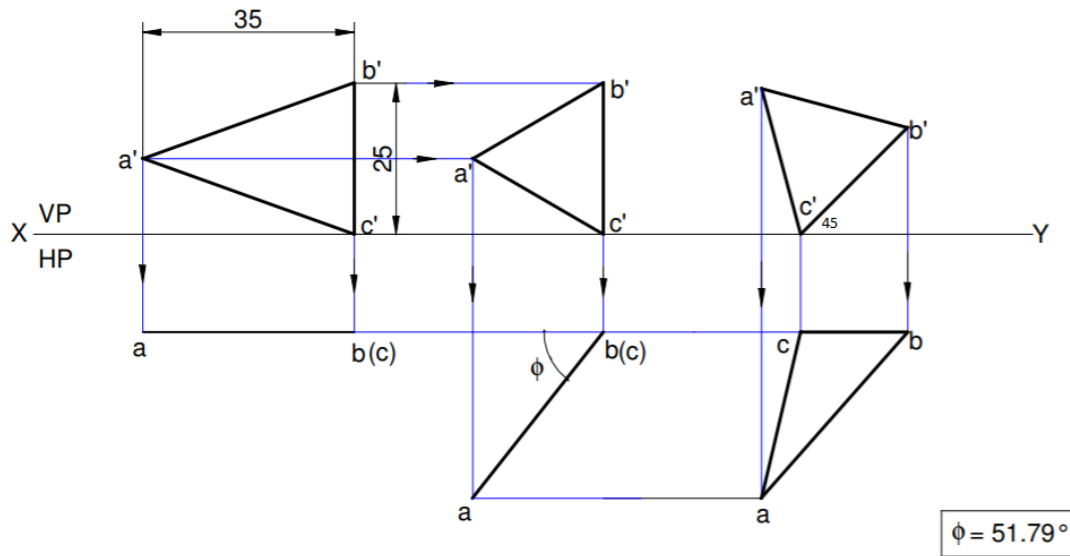
2. A mirror 30 mm X 40 mm is inclined to the wall such that its front view is a square of 30 mm side. The longer side of the mirror appear perpendicular to both HP and VP. Find the inclination of the mirror with the wall.
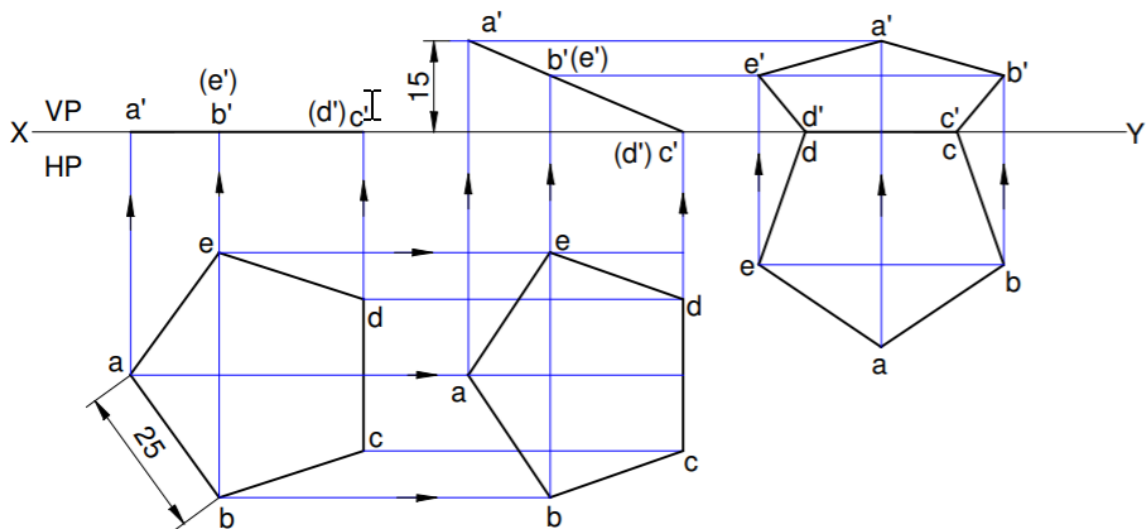
Solution:

$\phi = 41.41°$
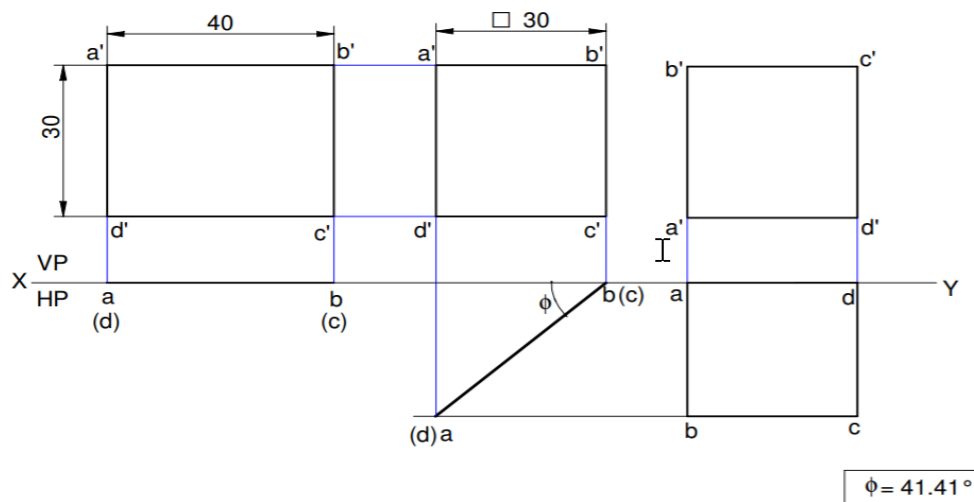
3. A pentagonal lamina of edges 25 mm is resting on HP with one of its corner such that the edge opposite to this corner is 20 mm above HP & makes an angle of 45 deg. with VP. Draw the top and front views of the plane lamina in this position. Determine the inclination of the lamina with HP.
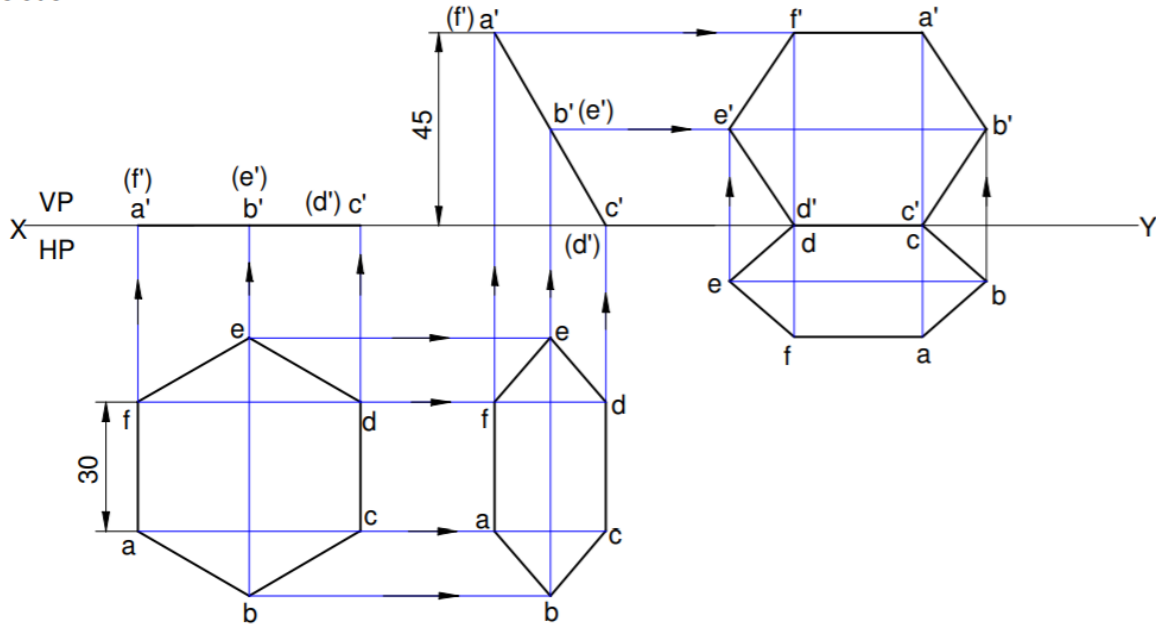
Solution:

ANSWER
$\theta = 31.32°$

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

Solution:

5. A regular hexagonal lamina of side 30 mm 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 45 mm above HP. Draw the projections of the lamina.

Solution:

6 A regular hexagonal lamina of side 25 mm is lying in such a way that one of its corners on HP while the corner opposite to the corner on which it rests on VP. If the lamina makes 60 deg. to HP. Draw the projections of the lamina.

Solution:
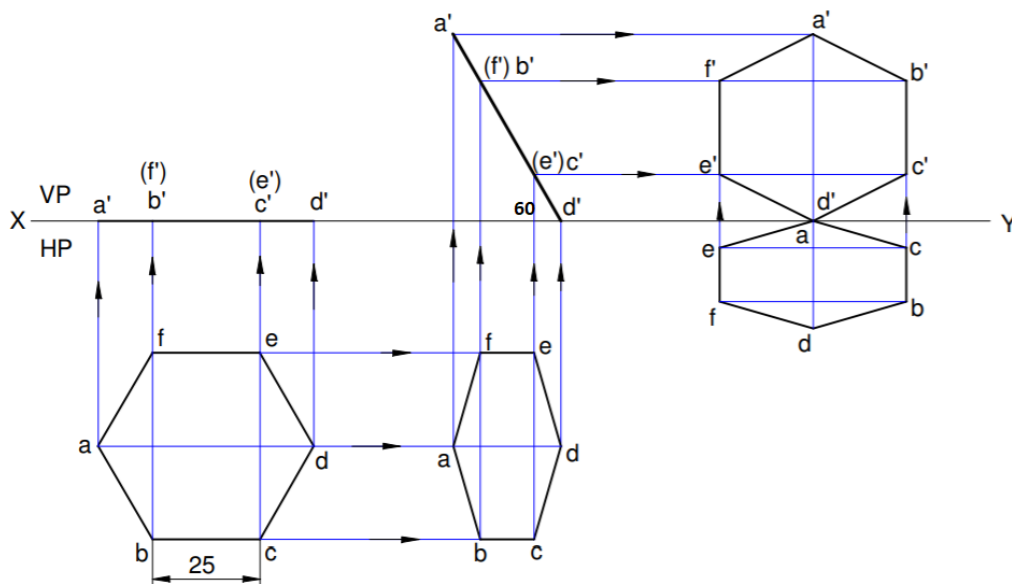
7. The top view of a square lamina of side 30 mm is a rectangle of sides 30 mm X 20 mm with a longer side of the rectangle being parallel to both HP and VP. Draw the top and front views of the square lamina. What is the inclination of the lamina with HP and VP.
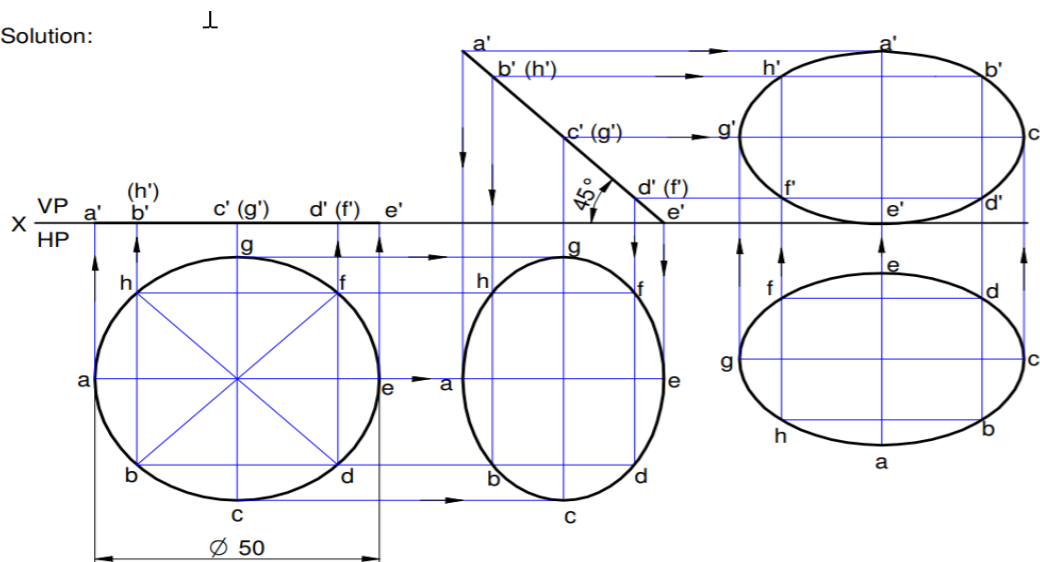
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Solution:
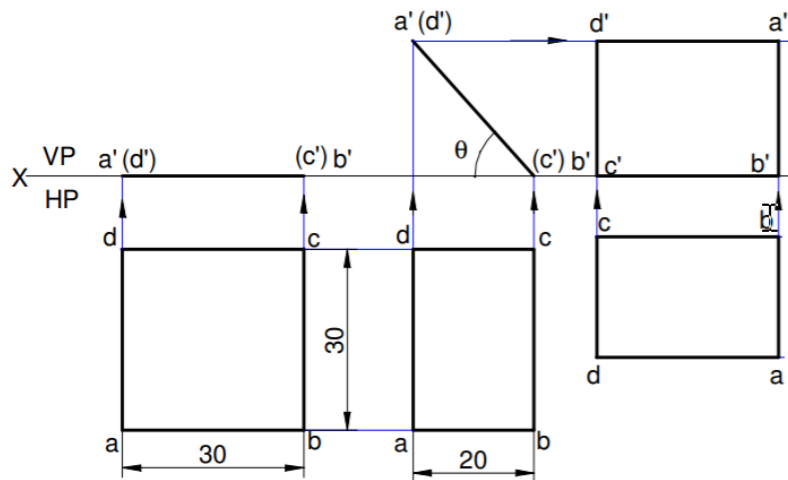
ANSWERS

$\theta = 48.19°$

8.A circular lamina of 50 mm diameter is standing with one of its points on the rim on HP and the lamina inclined at 45 deg. to HP. The diameter at right angle to the diameter which is passing through the point on which the lamina rests is parallel to VP. Draw its projections.

Solution:

PROJECTION OF SOLIDS

1.A square prism 35mm sides of base and 65 mm axis length rests on HP on one of its edges of the base which is inclined to VP at 30 deg. Draw the projections of the prism when the axis is inclined to HP at 45 deg.
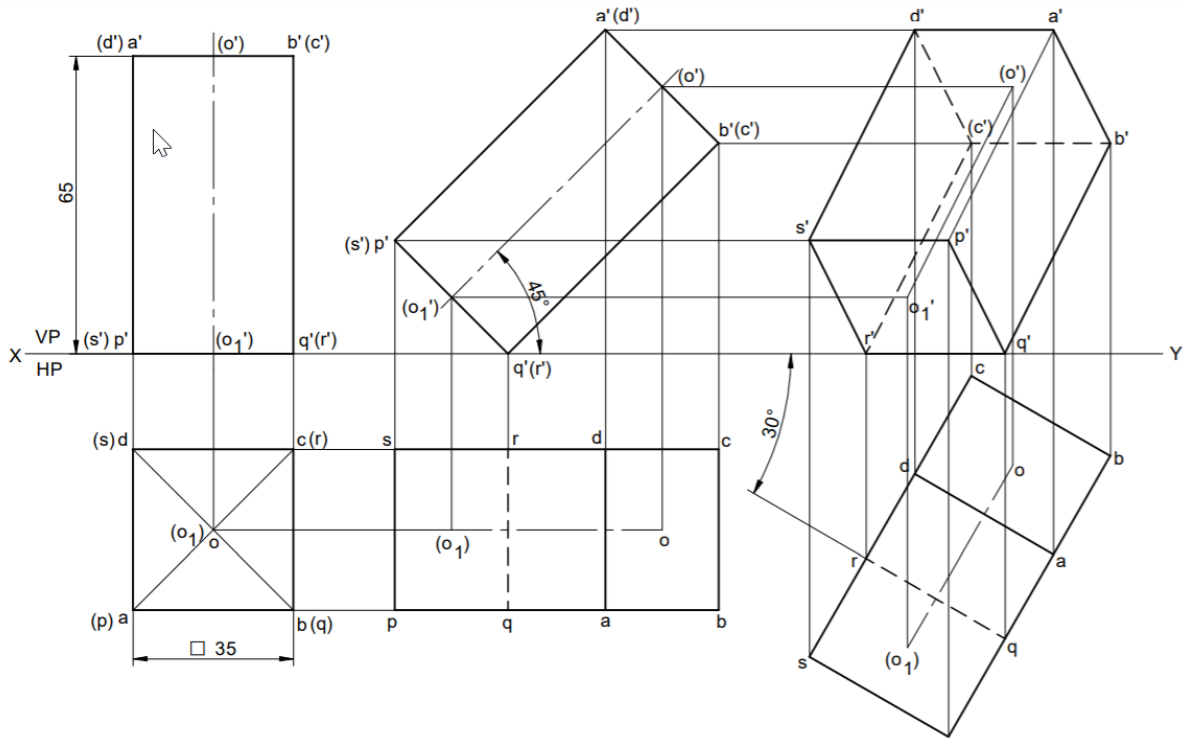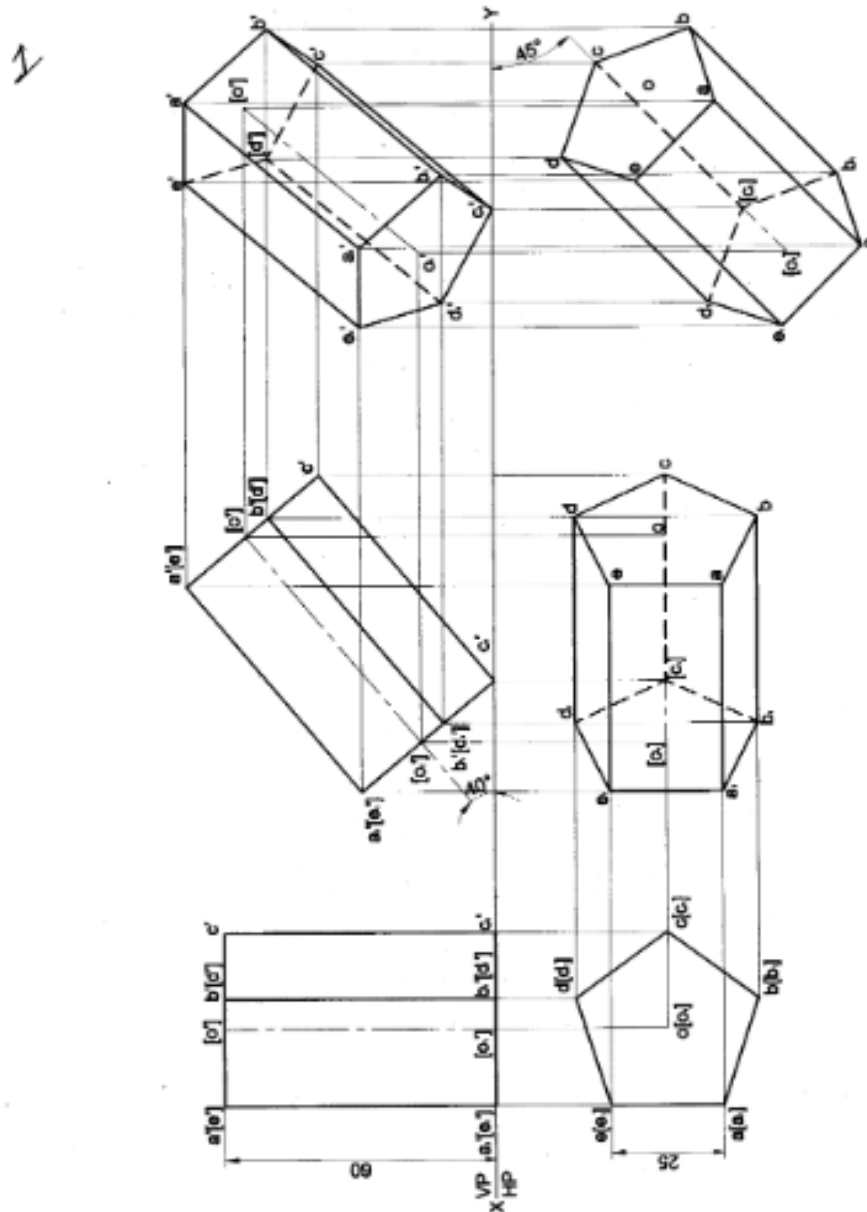
2.A hexagonal prism 25 mm sides of base and 50 mm axis length rests on HP on one of its edges. Draw the projections of the prism when the axis is inclined to HP at 45 deg. and appears to be inclined to VP at 40 deg
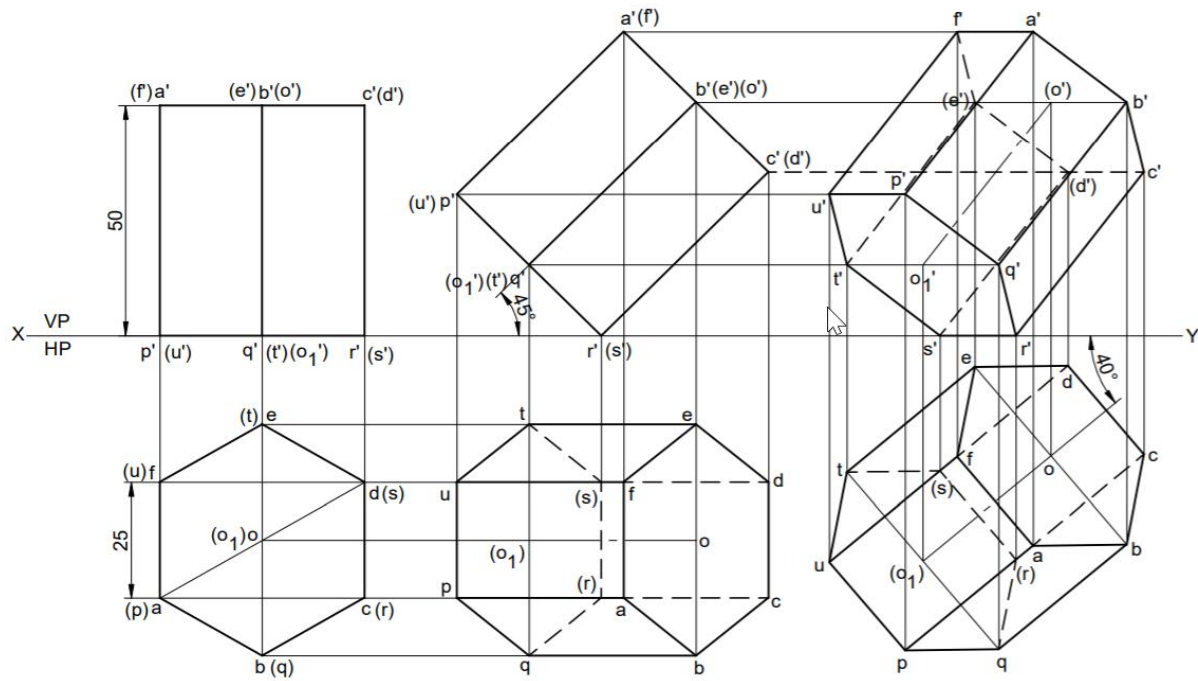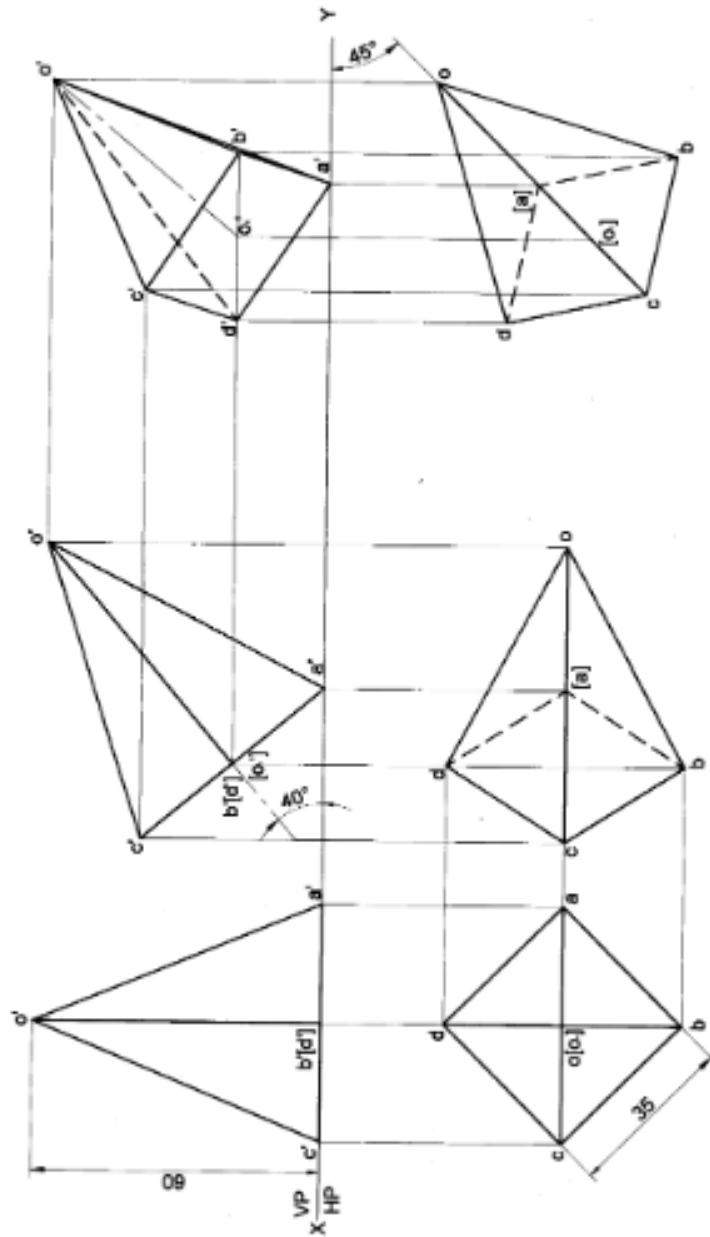
3. A pentagonal prism 25 mm sides of base and 50 mm axis length rests on HP on one of its comers of the base such that the two base edges containing the comer on which it rests make equal inclinations with HP. Draw the projections of the prism when the axis of the prism is inclined to HP at 40 deg and appears to be inclined to VP at 45 deg.
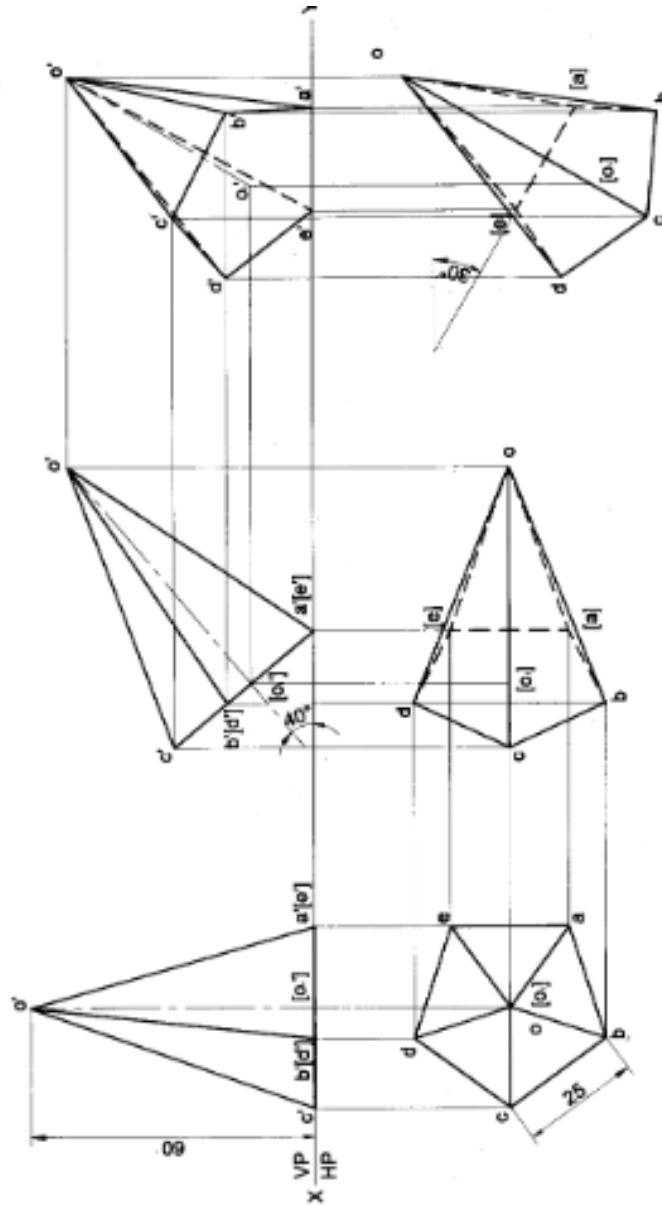
Solution

4. A square pyramid 35 mm sides of base and 60 mm axis length rests on HP on one of Its comers of the base such that the two base edges containing the comeron which it rests make equal inclinations with HP. Draw the projections of the pyramid when the axis of the pyramid is inclined to HP at 40 deg and appears to be Inclined to VP at 45 deg.
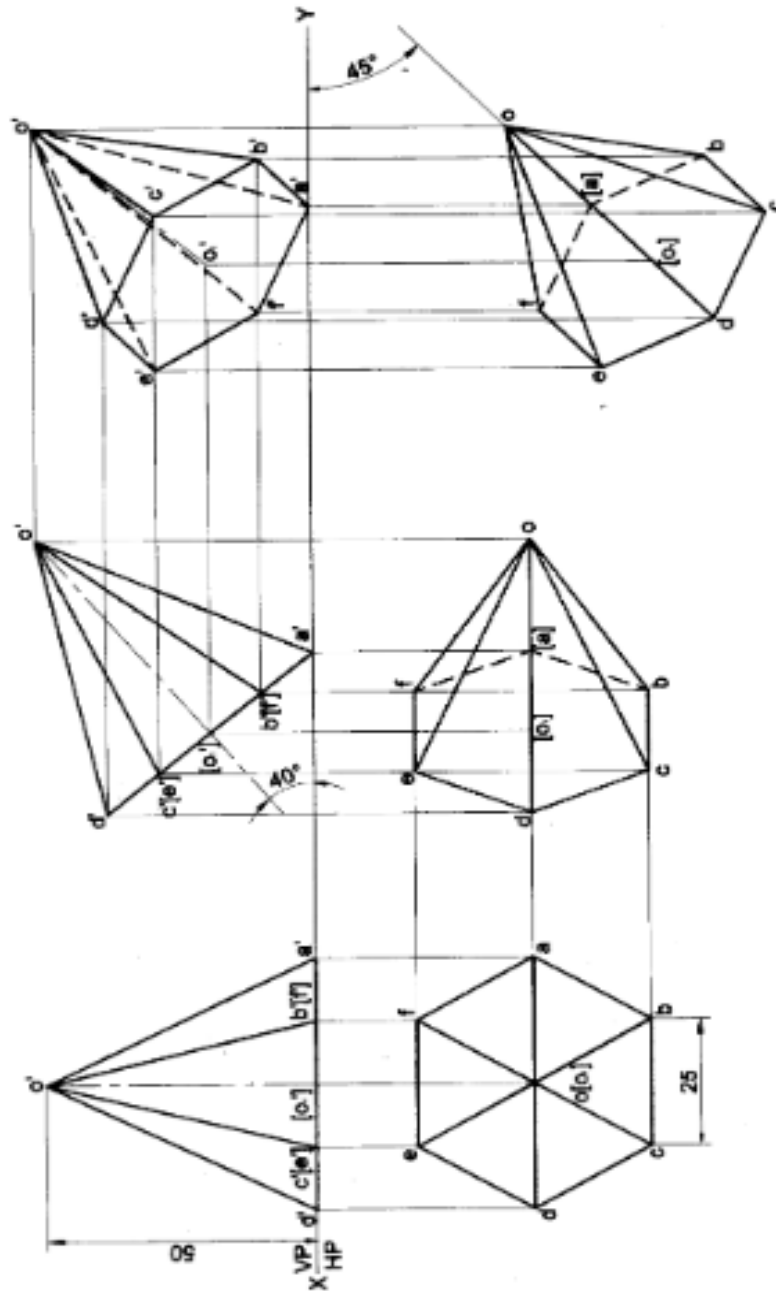
Solution

5. A pentagonal pyramid 25 mm sides of base and 60 mm axis length rests on HP on one of Its edges of the base which is inclined to VP at 30 deg . Draw the projections of the pyramid when the axis is inclined to HP at 40 deg.

6. A hexagonal pyramid 25 mm Sides of base and 50 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the comer on which it rests make equal inclinations with HP. Draw the projections of the pyramid when the axis of the pyramid is inclined to HP at 40deg and appears to be inclined to VP at 45deg.
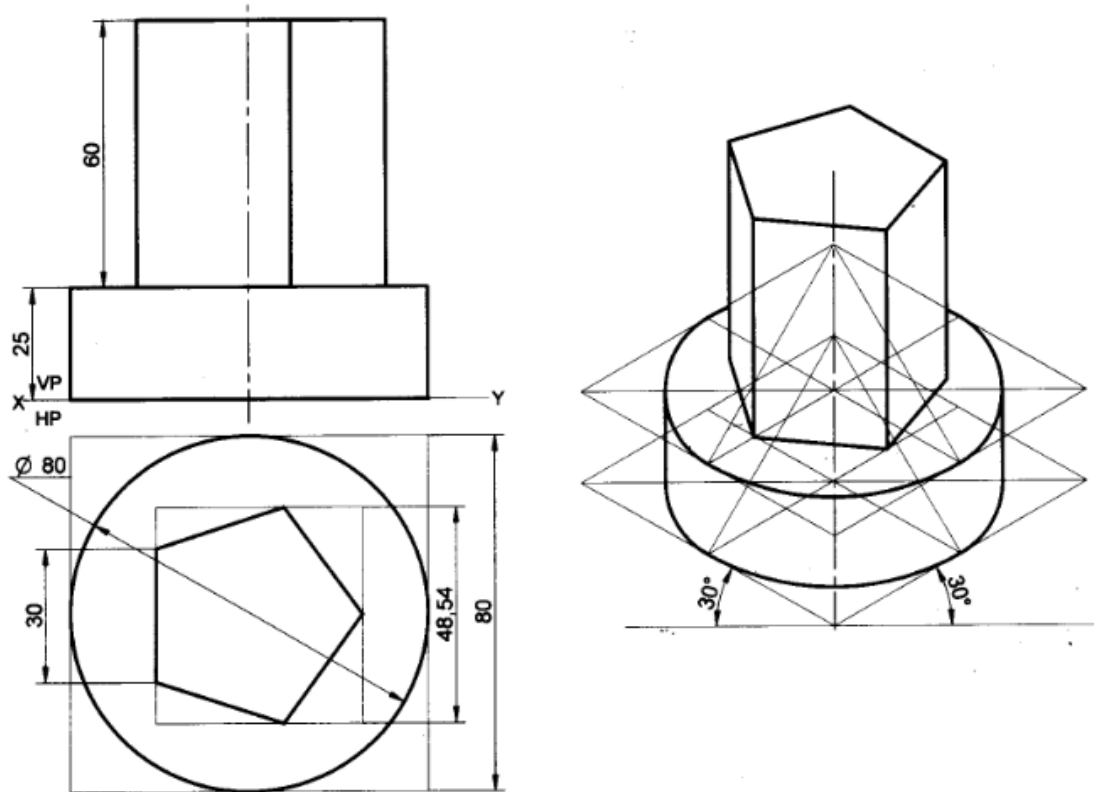
ISOMETRIC PROJECTION

1. A Sphere with a 60 mm diameter is resting centrally on the Top of the Square Block with a 70 mm side 20 mm thickness. Draw an isometric view of the arrangement?
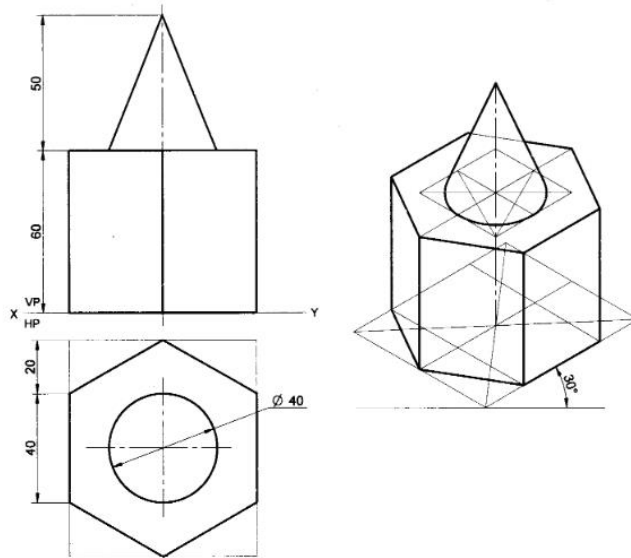
Solution:
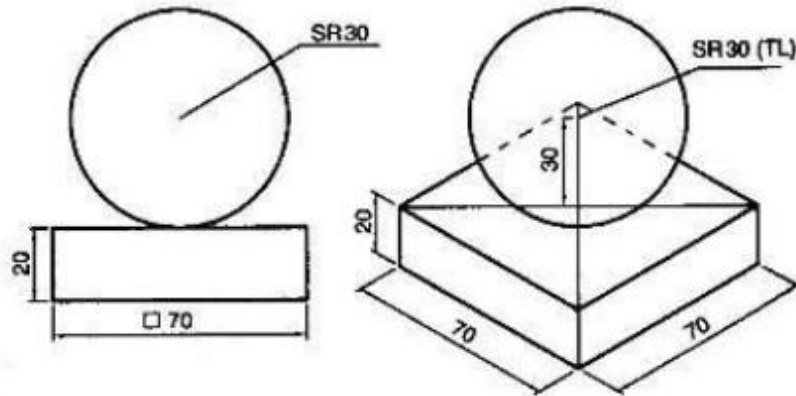
2. A regular pentagonal prism of base edge 30mm and axis 60mm is mounted centrally over a cylindrical block of 80mm diameter and 25mm thick. Draw isometric projection of the combined solids
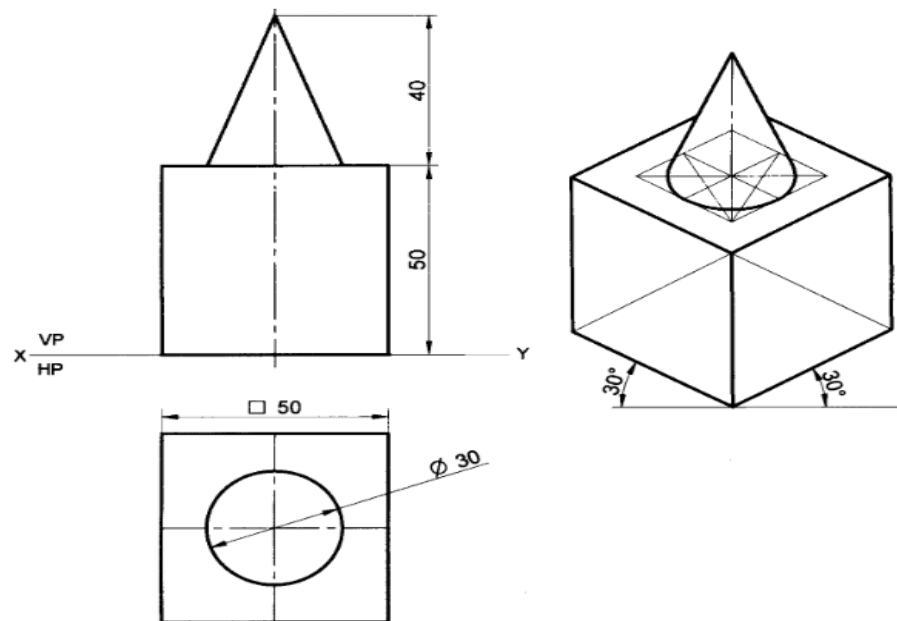
Solution

3. Draw isometric projection of a hexagonal prism of side of base 40mm and height 60mm with a right circular cone of base 40mm as diameter and altitude 50mm,resting on its top such that the axes of both the solids are collinear.
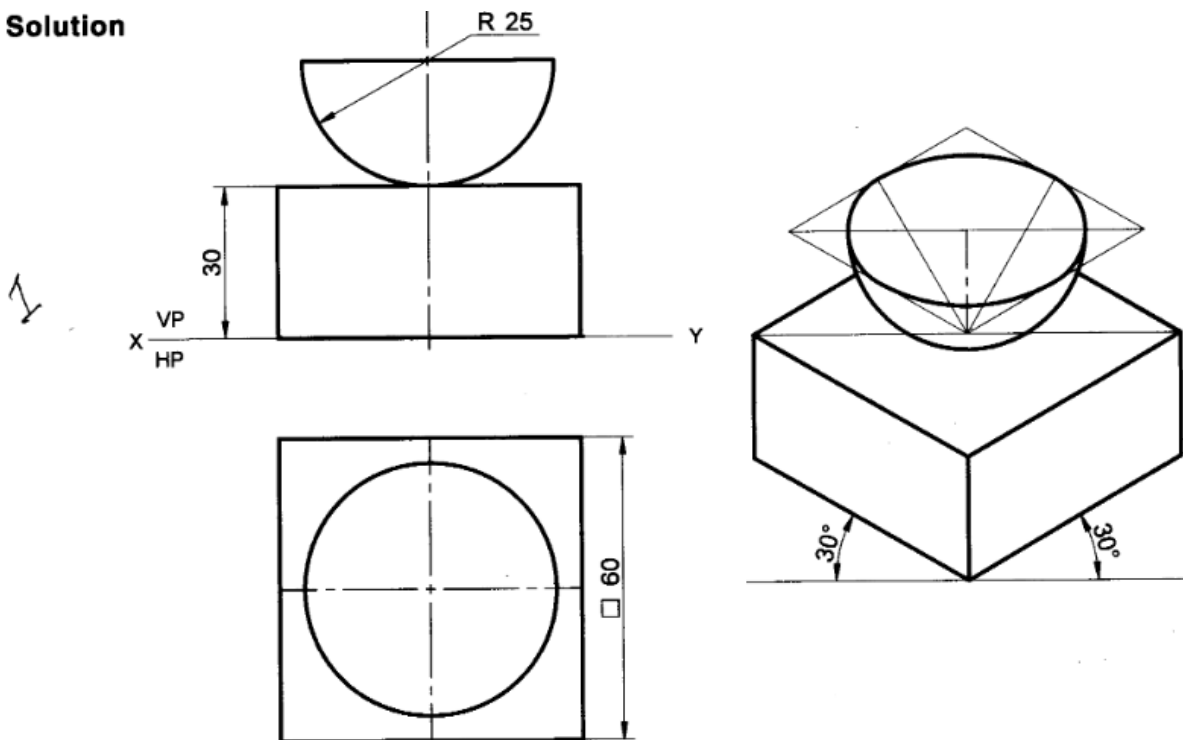
Solution

4. A cone of base diameter 30mm and height 40mm rests centrally over a cube of side 50mm.Draw the isometric projection of the combination of solids

Solution

5. A hemisphere of diameter 5Ommis centrally resting on top of a square prism of base side 60mm and height 30mm such that the curved surface of hemisphere is touching the top face of the prism. Draw its isometric projections
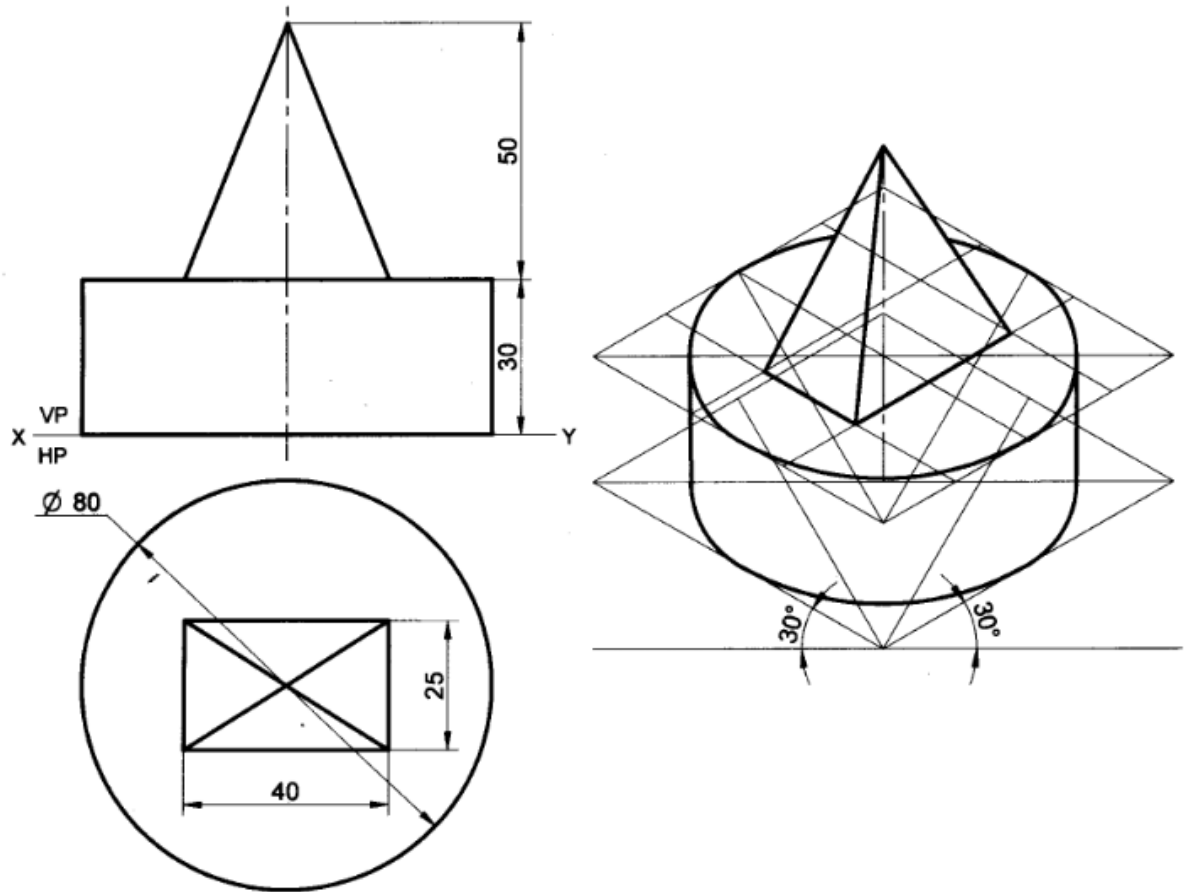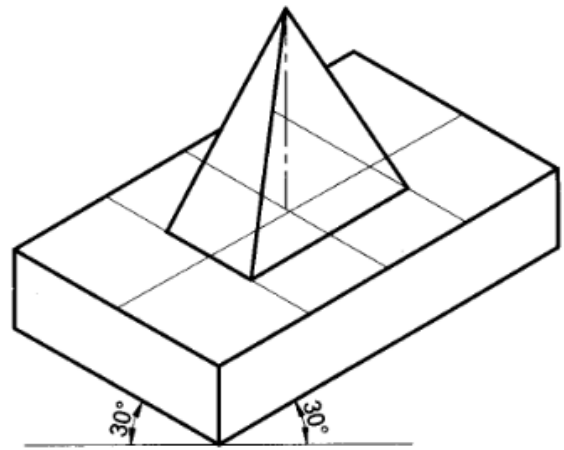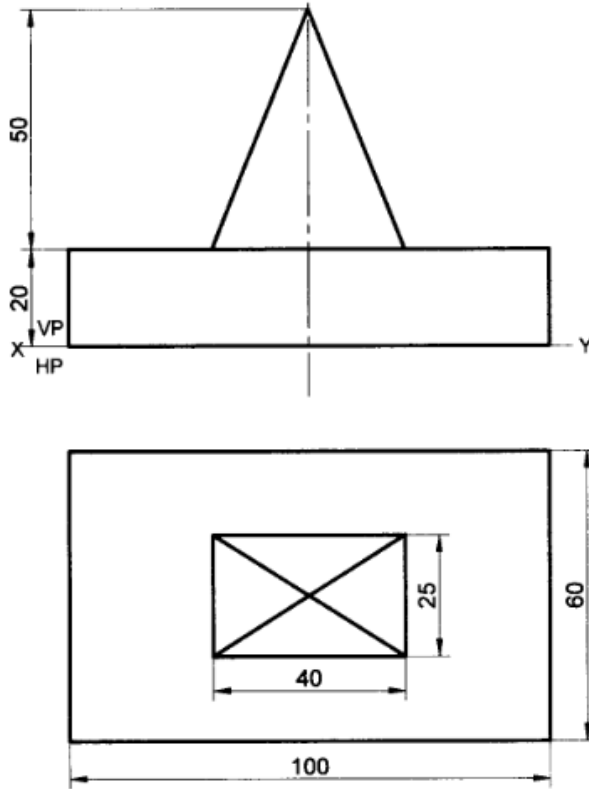
Solution

6. A rectangular pyramid of base-40mmx25mm and height 50mm is placed centrally on a cylindrical slab of diameter 100mm and thickness-30mm. Draw the isometric projection of the combination

Solution

7 A rectangular pyramid of base-40mmx25mm and height50mm is placed centrally on a rectangular slab sides-100mmx60mm and thickness-20mm. Draw the isometric projection of the combination

Solution

8 A square prism base side-40mm, height 50mm is placed centrally on a cylindrical slab of diameter 100mm and thickness-30mm. Draw the isometric projection of the combination

Solution