Teaching Aids Required for this Sheet
(The RA should bring them to the class)

- A pair of hinged square acrylic plates; this can be used to denote the quadrants.
- A square acrylic plate to denote auxiliary plane.
- The following shapes in cardboard: Equilateral triangle, Isosceles triangle, Right angle triangle with other angles as 30° and 60°, Square, Rectangle, Regular pentagon, Regular hexagon, Circle.

ME119:
Engineering Drawing & Graphics

5. Projections of Planar Features

Department of Mechanical Engineering
Indian Institute of Technology Bombay

Outline

- Planar Feature Inclined to One Plane Only
- Planar Feature Inclined to Both the Planes
- True Sizes and Shapes of Planar Features
- Conclusions

Projections of Planar Features

- Chapters 12 covers the details on Projections of Planar Features.
- Roughly work out all the problems given to you.

Note: For the sake of simplicity and uniformity, we shall use only 1st angle projection.

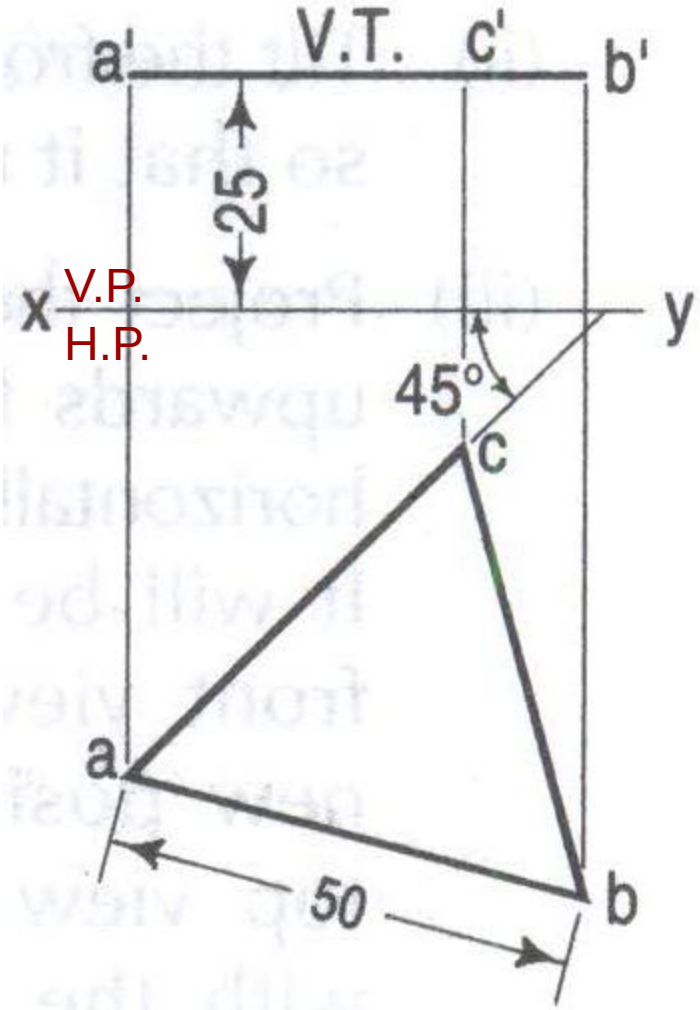
Planar Feature Inclined to One Plane Only

Projections of a Planar Features

Example-1 (Solved Pb. 12-2, pp. 259)

An equilateral triangle of 50mm side has its V.T. parallel to and 25mm above *xy*. It has no H.T. One of its sides is inclined at 45° to V.P. Draw its projections.

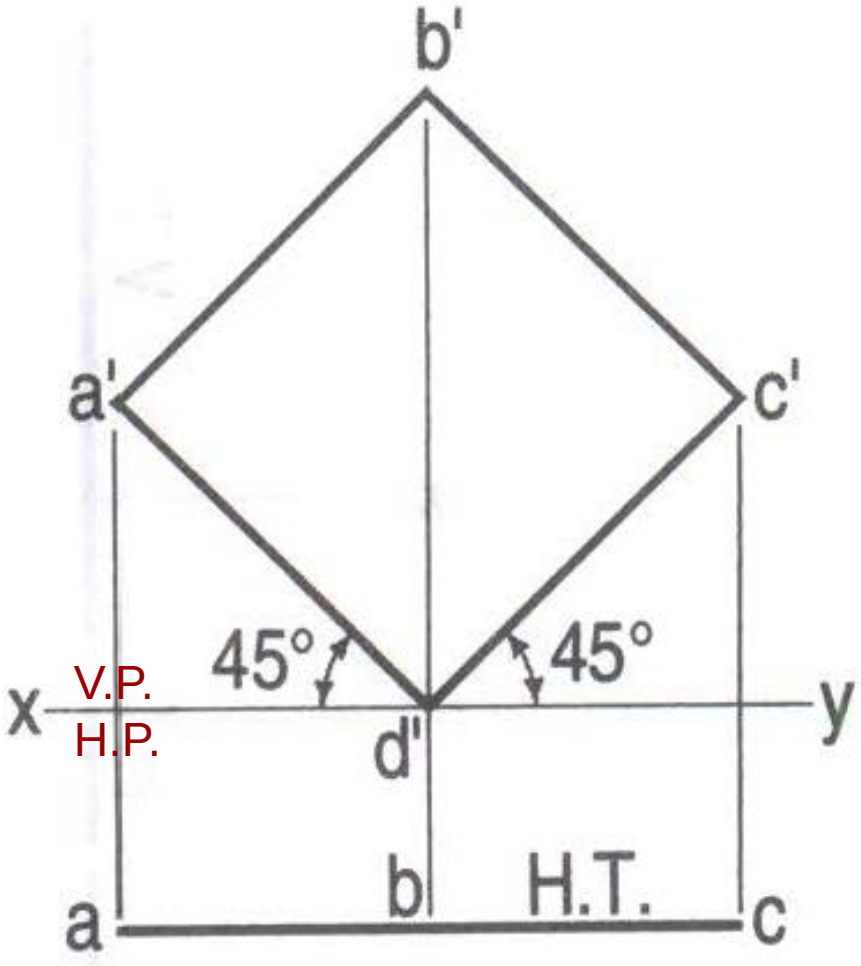
V.T. parallel to *xy*; it has no H.T. → ABC is Parallel to H.P. So, true shape and size will be visible in plan.



Projections of a Planar Features

Example-2 (Solved Pb. 12-3, pp. 260)

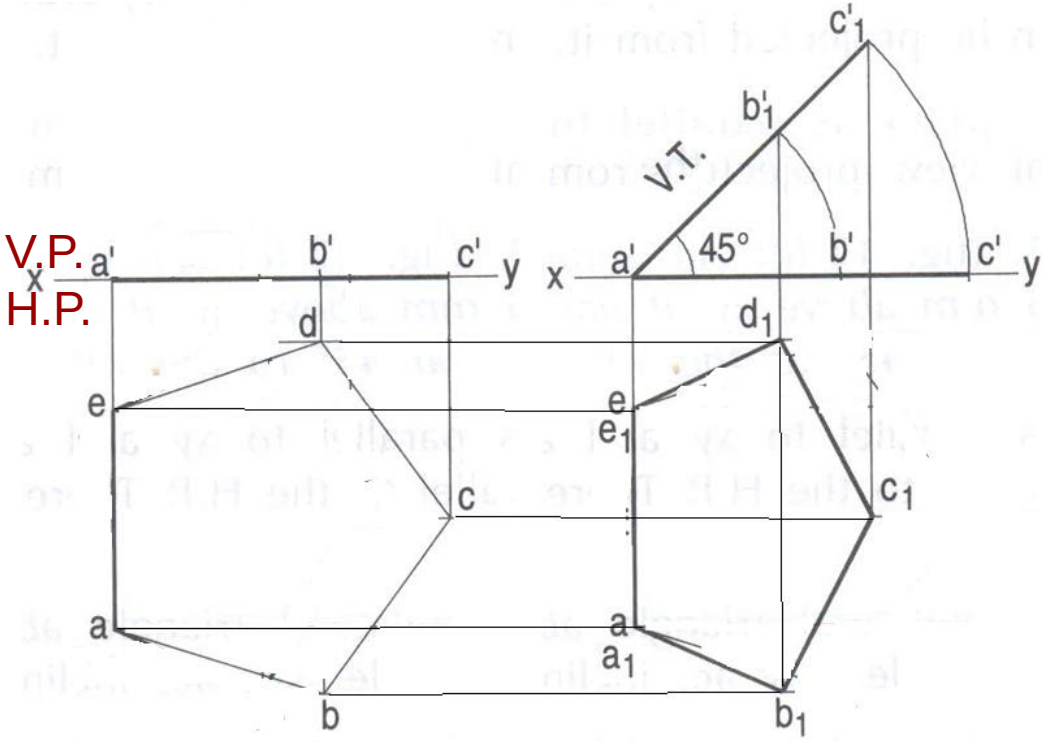
A square ABCD of 40mm side has a corner on the H.P. 20mm in front of V.P. All its sides are equally inclined to H.P. and parallel to V.P. Draw its projections and show its traces.



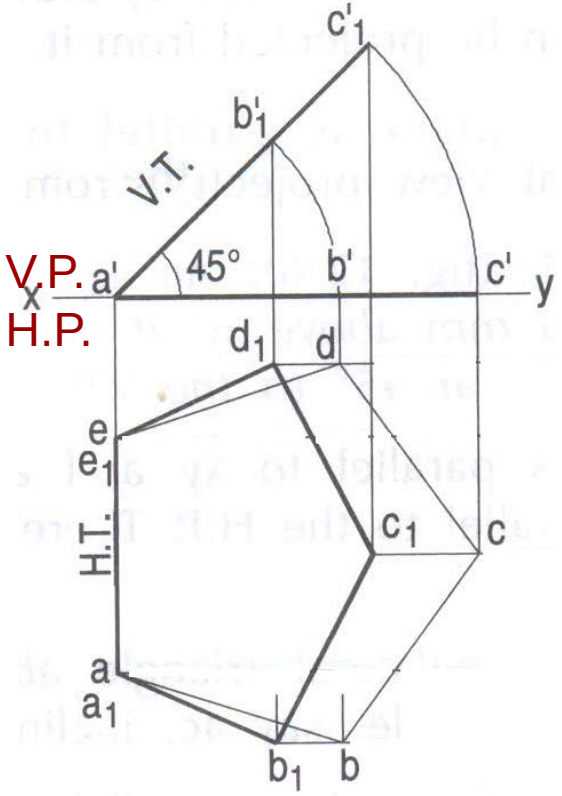
Projections of a Planar Features

Example-3 (Solved Pb. 12-4, pp. 260)

A regular pentagon of 25mm side has its one side on H.P. Its plane is inclined at 45° to H.P. and perpendicular to V.P. Draw its projections and show its traces.



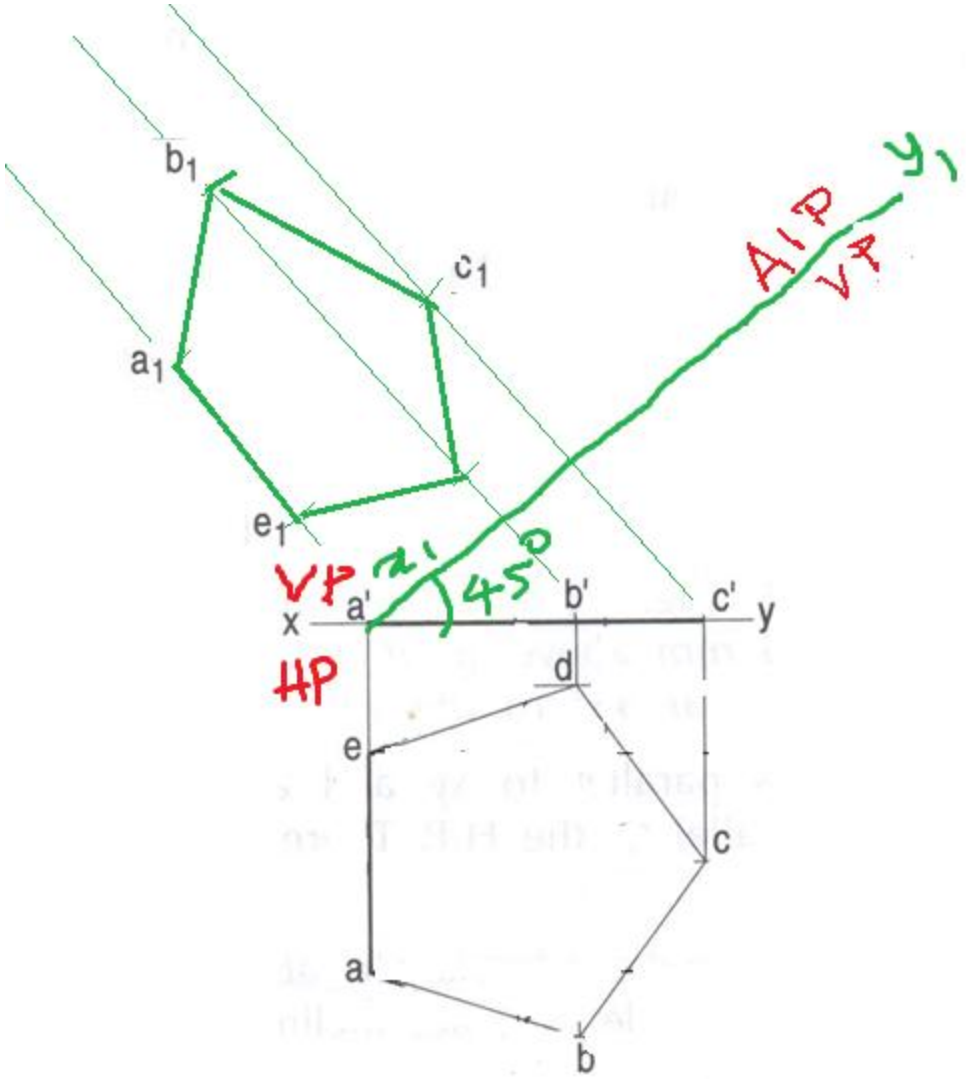
Usual method of separate sets of views



Superimposed sets of views

Projections of a Planar Features

Example-3 (Solved Pb. 12-4, pp. 260) …

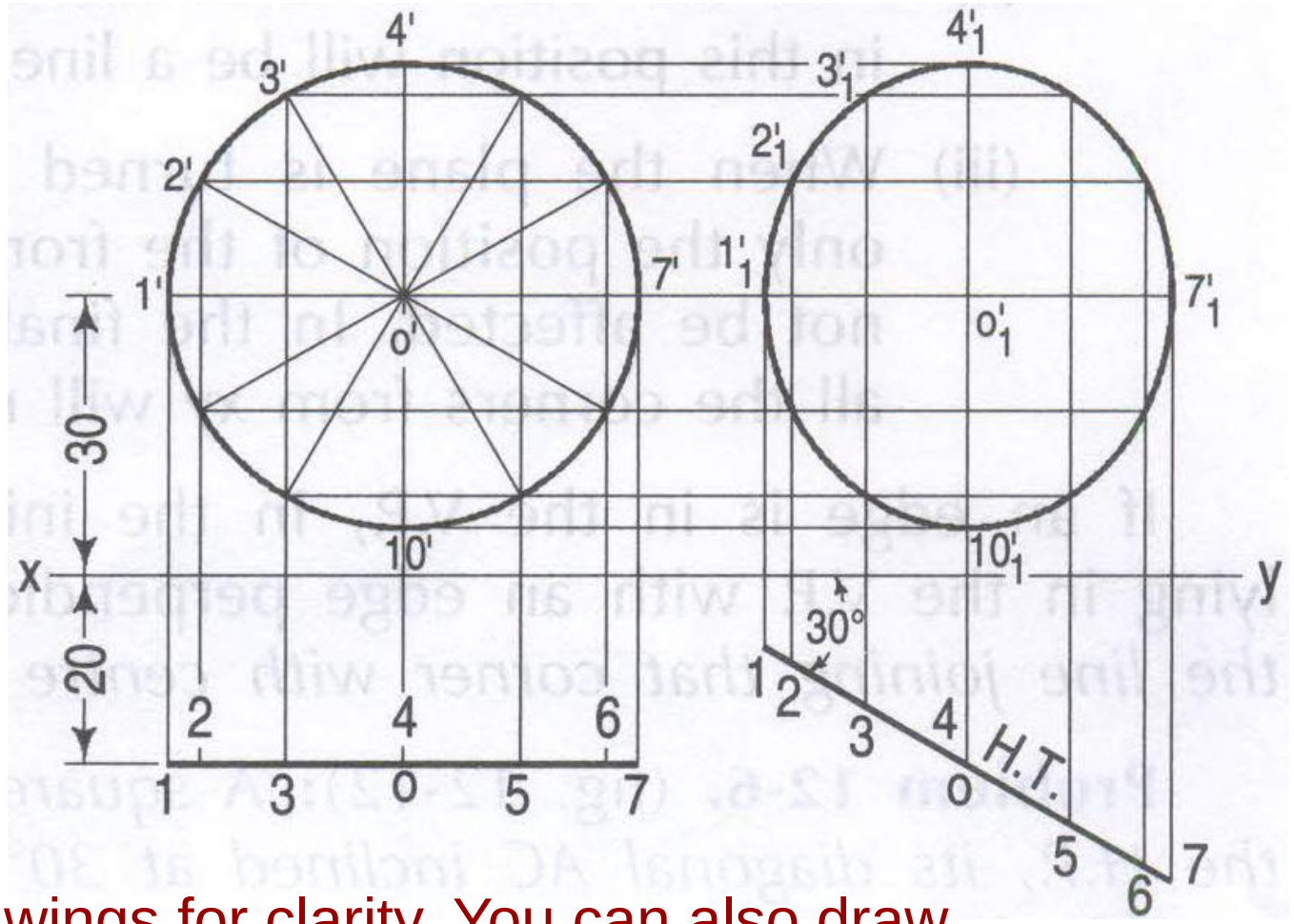


Auxiliary view method

Projections of a Planar Features

Example-4 (Solved Pb. 12-5, pp. 261)

A circle of 50mm diameter is contained in a vertical plane inclined at 30° to V.P. Its center is 30mm above H.P. and 20mm in front of V.P. Draw its projections and show its traces.

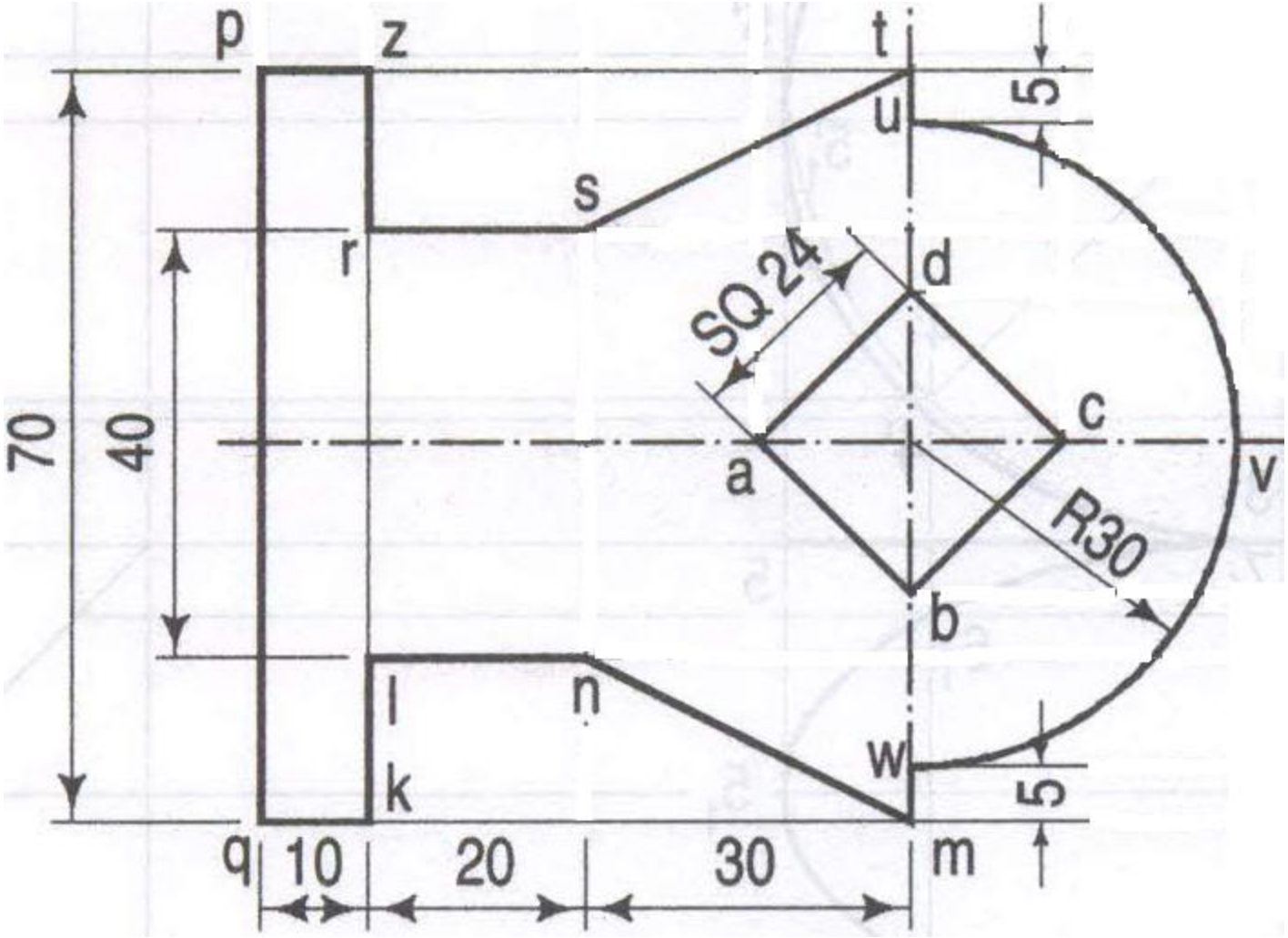


This is split into two drawings for clarity. You can also draw in a single drawing with circle and ellipse superimposed.

Projections of a Planar Features

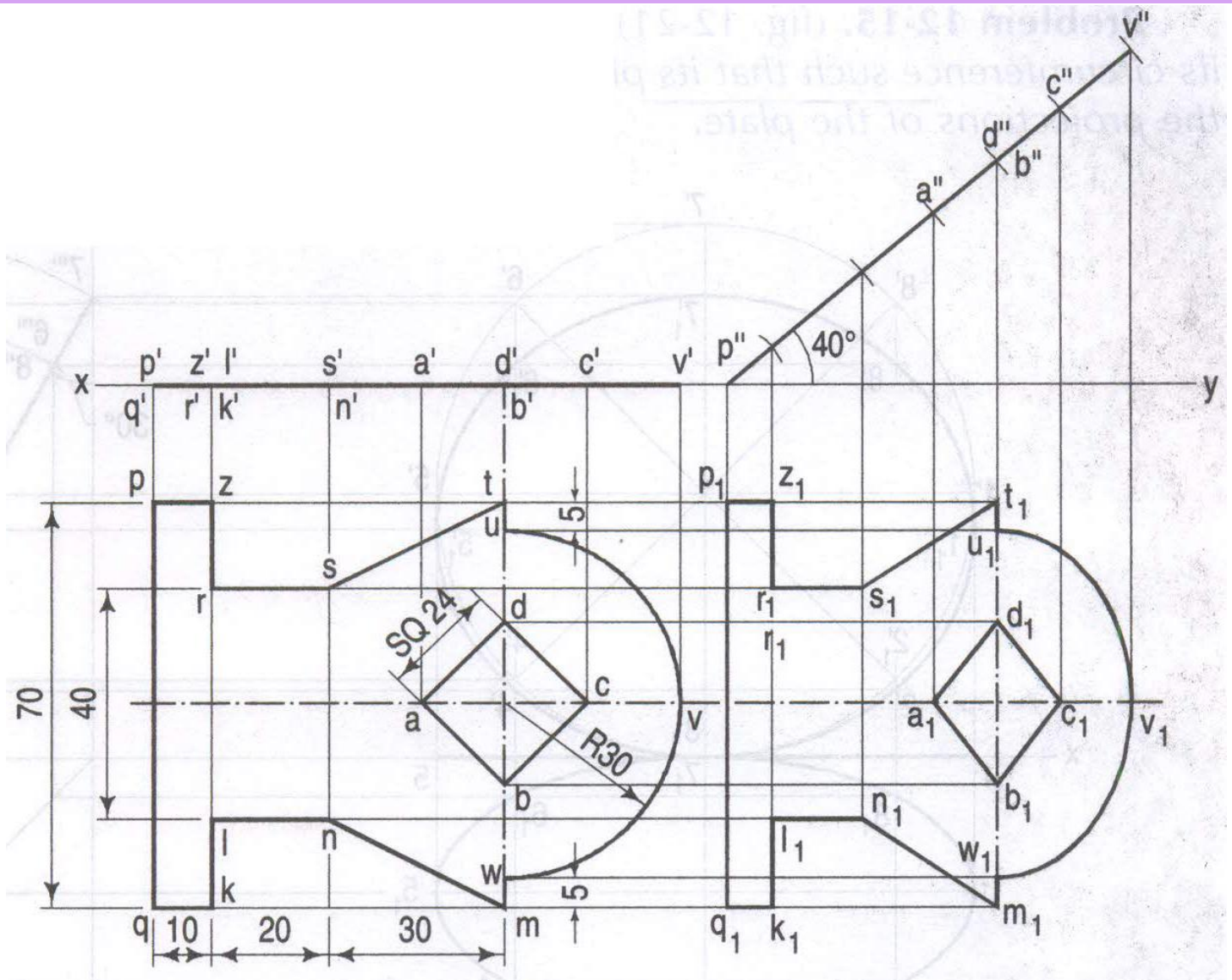
Example-13 (Solved Pb. 12-13, pp. 267)

A plate of negligible thickness shown in the figure rests on its side PQ with is plane perpendicular to V.P. and inclined at 40° to H.P. Draw its projections.



Projections of a Planar Features

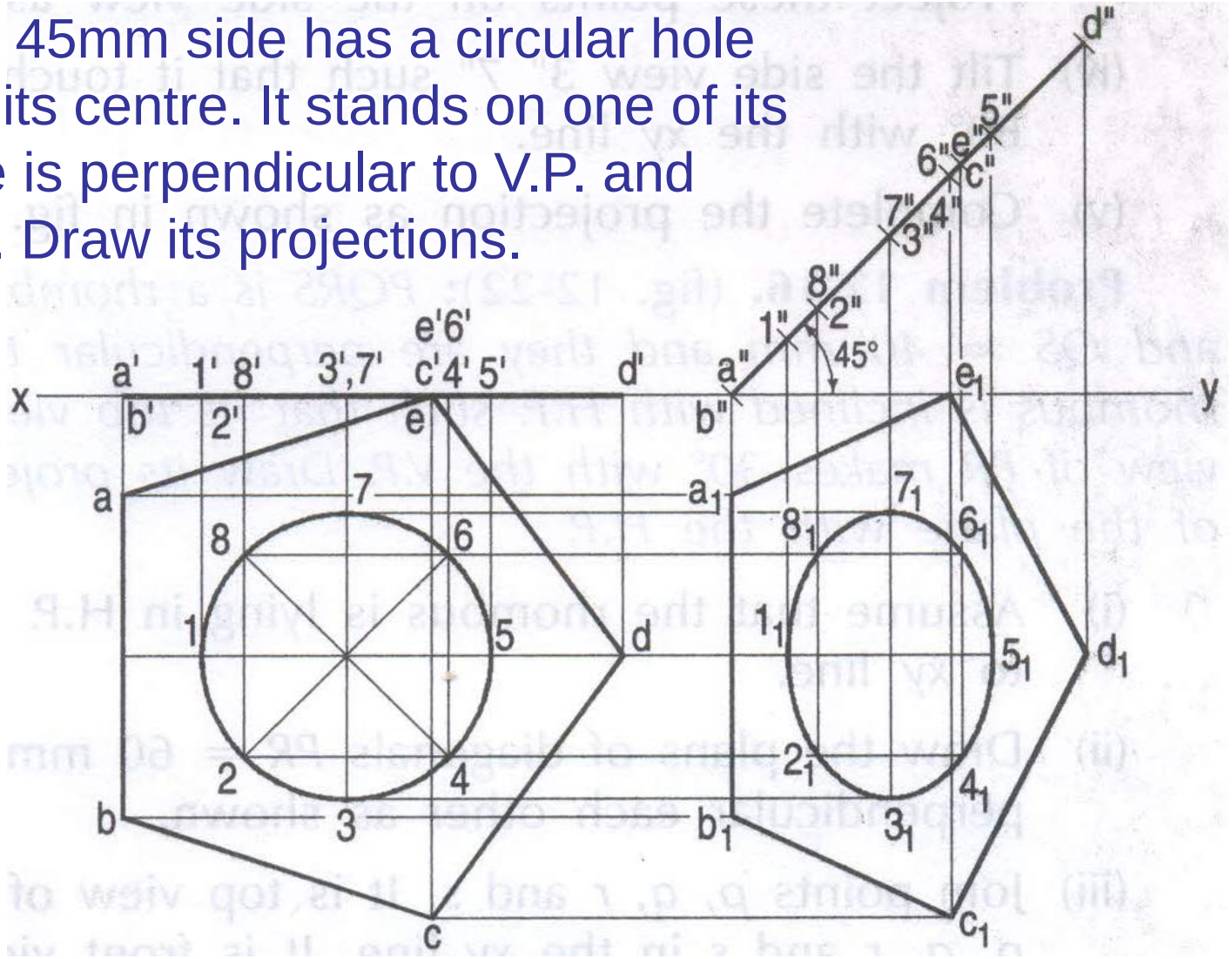
Example-13 (Solved Pb. 12-13, pp. 267) …



Projections of a Planar Features

Example-14 (Solved Pb. 12-14, pp. 267)

A pentagonal plate of 45mm side has a circular hole of 40mm diameter at its centre. It stands on one of its sides in H.P. Its plane is perpendicular to V.P. and inclined at 45° to H.P. Draw its projections.



Planar Feature Inclined to Both the Planes

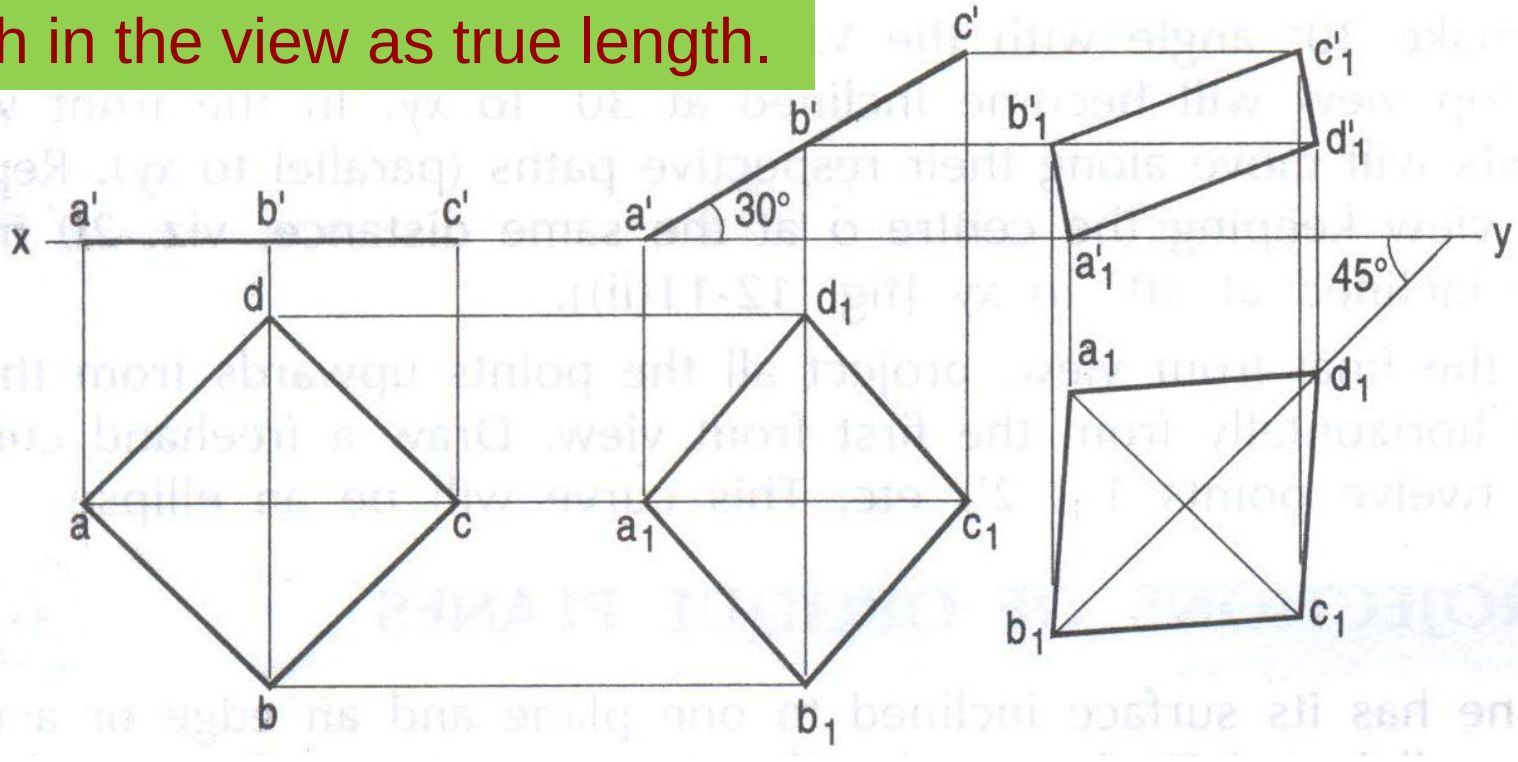
Projections of a Planar Features

Example-5 (Solved Pb. 12-6, pp. 262)

A square ABCD of 50mm side has its corner A in H.P. Its diagonals AC and BD respectively are inclined at 30° to H.P. 45° to V.P. The diagonal BD is parallel to H.P. Draw its projections.

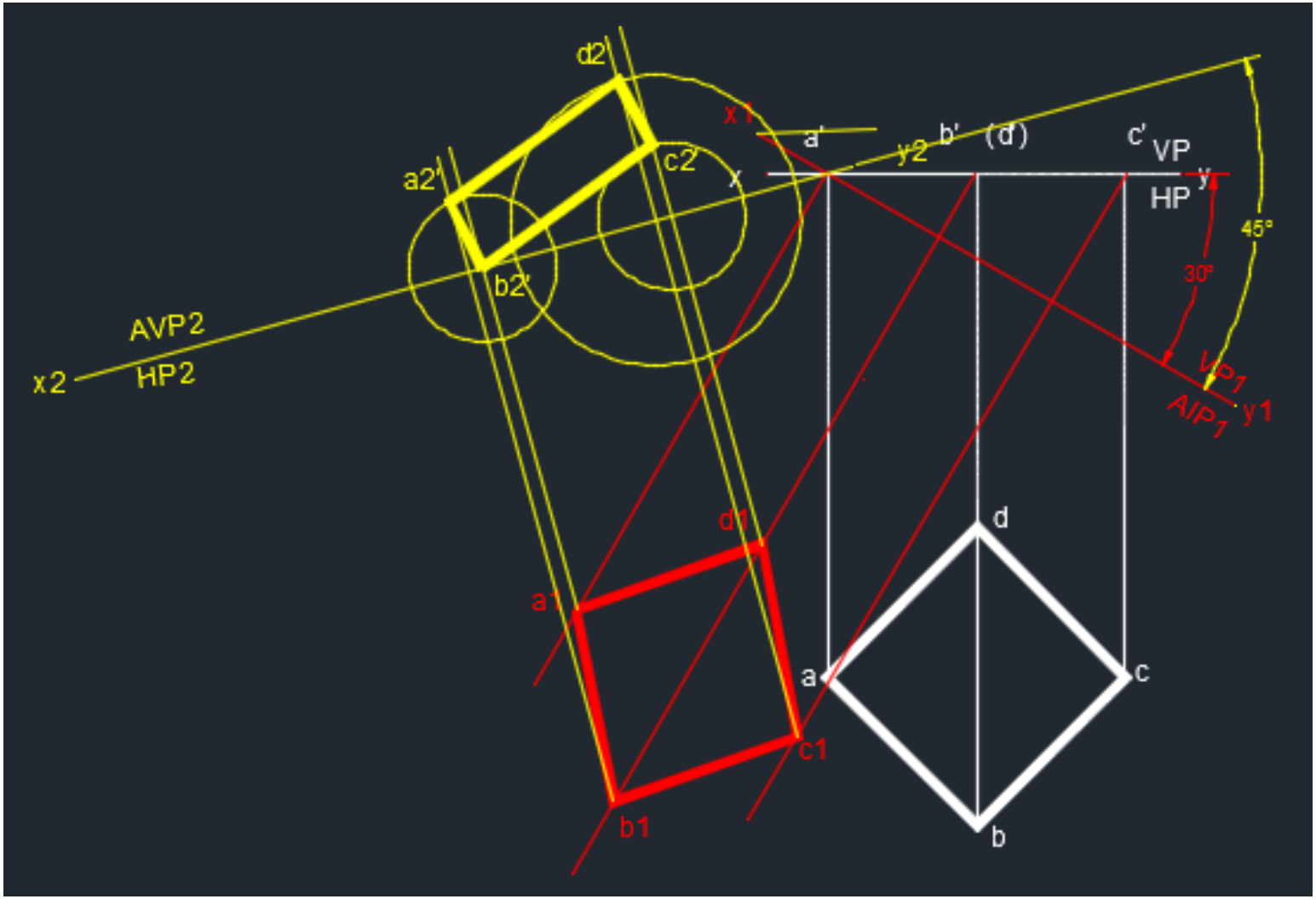
Caution: 2nd rotation is valid only of you have at least one length in the view as true length.

Will aux. view make it easier?



Projections of a Planar Features

Example-5 (Solved Pb. 12-6, pp. 262) …



Hint: Draw top view sufficiently away from xy to avoid the other views overlapping.

Auxiliary view method

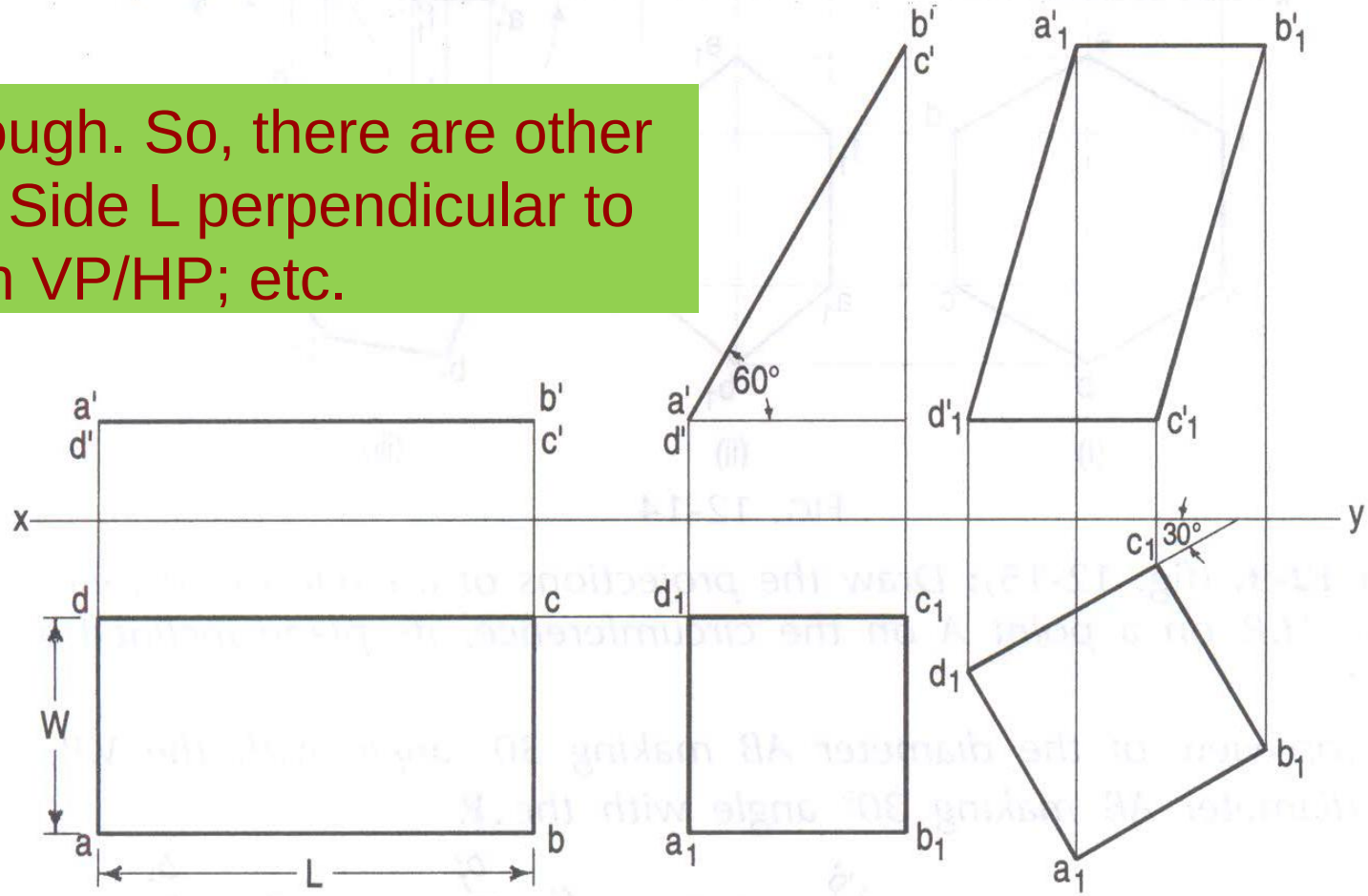
Projections of a Planar Features

Example-6 (Solved Pb. 12-7, pp. 263)

A rectangle of size L x W (= 100 x 50) is positioned in the 1st quadrant and is inclined at 60° to H.P. and 30° to V.P. Draw its projections.

Note: Data is not enough. So, there are other possibilities too. Eg.: Side L perpendicular to VP; edge could touch VP/HP; etc.

Will aux. view make it easier?



Projections of a Planar Features

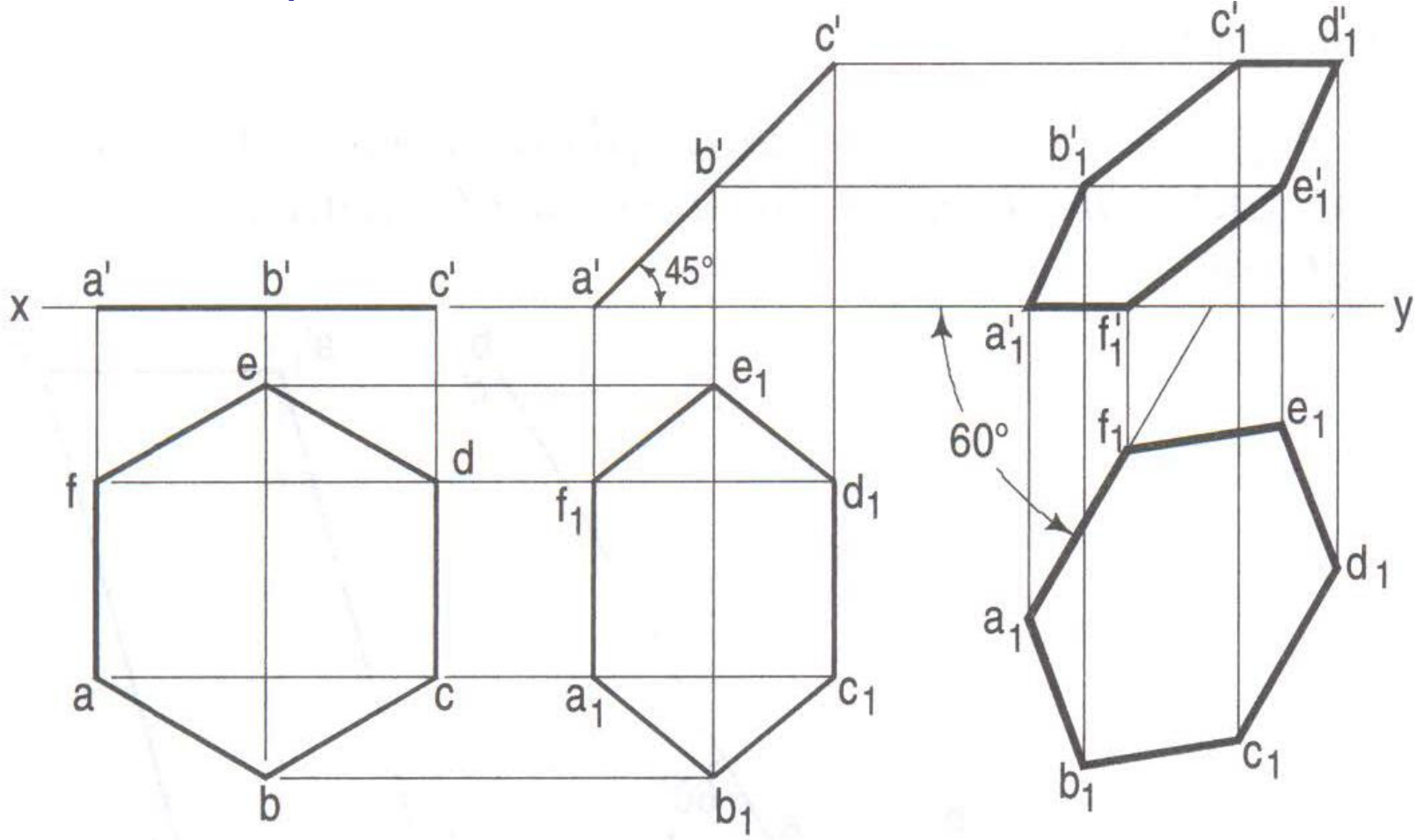
Example-6 (Solved Pb. 12-7, pp. 263) …

Hint: Draw top view sufficiently away from xy to avoid the other views overlapping.

Projections of a Planar Features

Example-7 (Solved Pb. 12-8, pp. 263)

A regular hexagon of 25mm side has one of its sides in H.P. and inclined at 60° to V.P. Its plane makes 45° with H.P. Draw its projections.



Will aux. view make it easier?

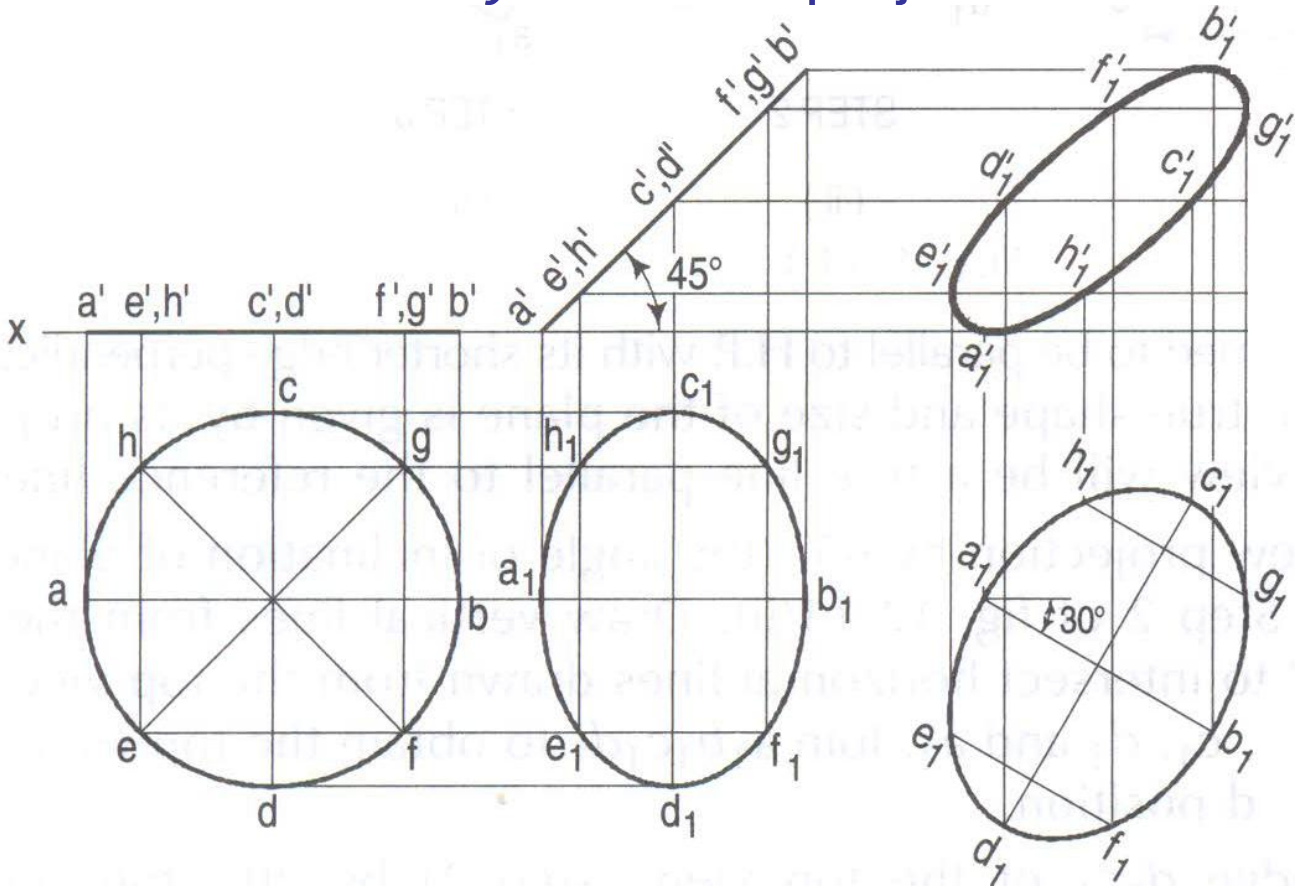
Projections of a Planar Features

Example-7 (Solved Pb. 12-8, pp. 263) …

Projections of a Planar Features

Example-8 (Solved Pb. 12-9a, pp. 264)

A circle of 50mm diameter rests in H.P. on a point A on its circumference. Its plane inclined at 45° to H.P. The top view of the diameter AB makes 30° to *xy*. Draw its projections.



Projections of a Planar Features

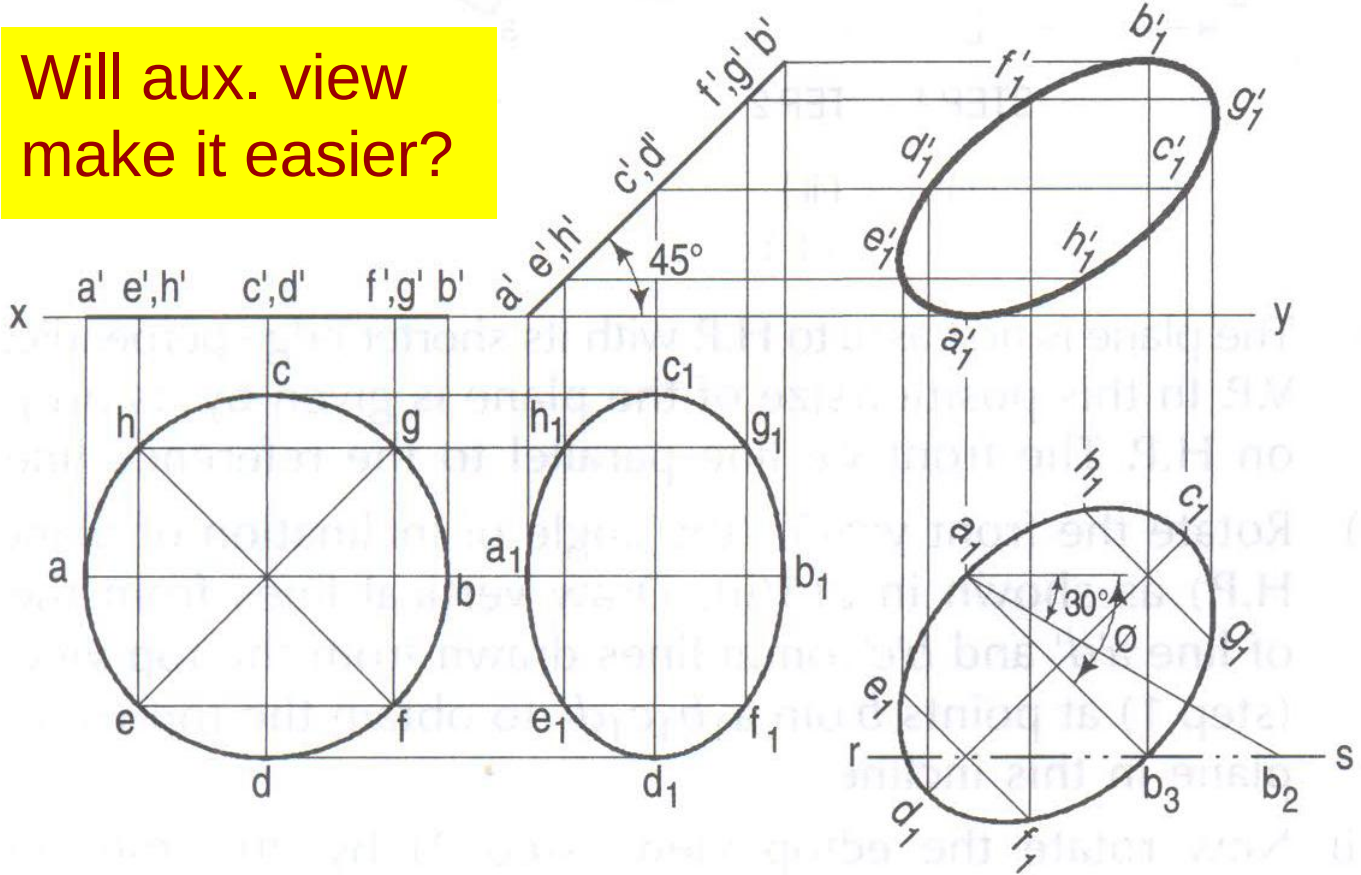
Example-8 (Solved Pb. 12-9a, pp. 264) …

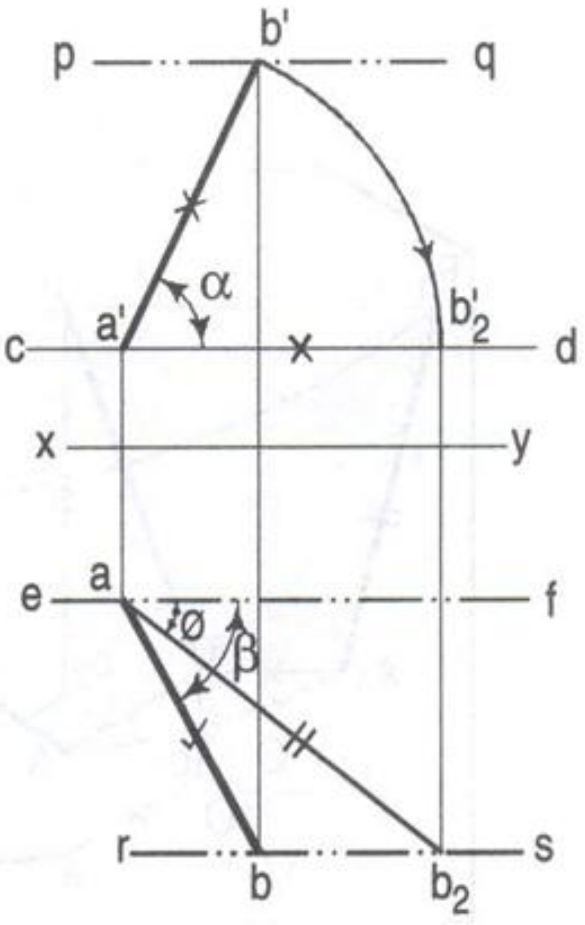
Projections of a Planar Features

Example-9 (Solved Pb. 12-9b, pp. 264)

A circle of 50mm diameter rests in H.P. on a point A on its circumference. Its plane inclined at 45° to H.P. The diameter AB makes 30° with V.P. Draw its projections.

Will aux. view make it easier?





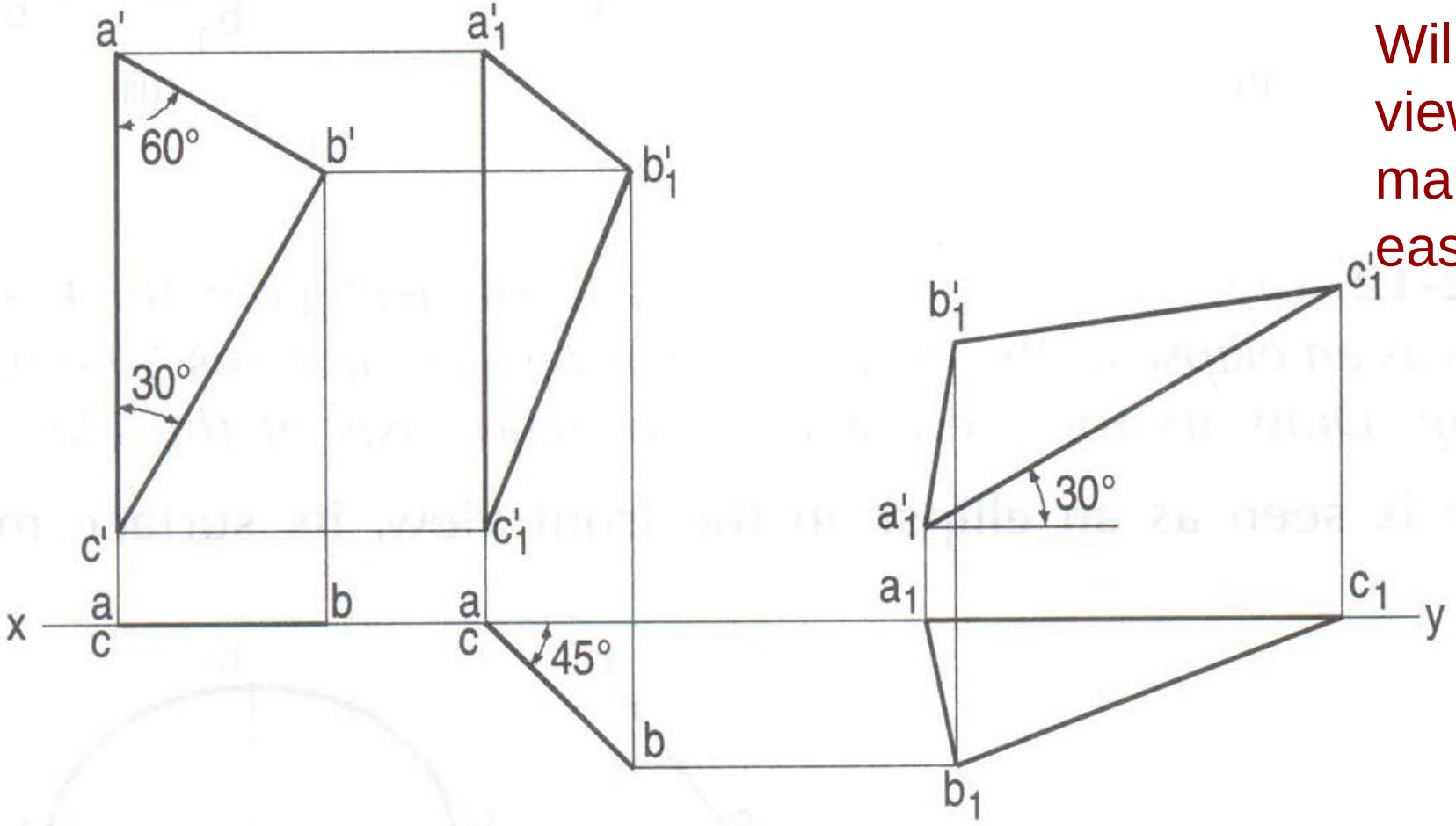
Projections of a Planar Features

Example-9 (Solved Pb. 12-9b, pp. 264) …

Projections of a Planar Features

Example-10 (Solved Pb. 12-10, pp. 265)

A thin 30°-60° set square has its longest edge in V.P. and inclined at 30° to H.P. Its surface makes 45° with V.P. Draw its projections.



Will aux. view make it easier?

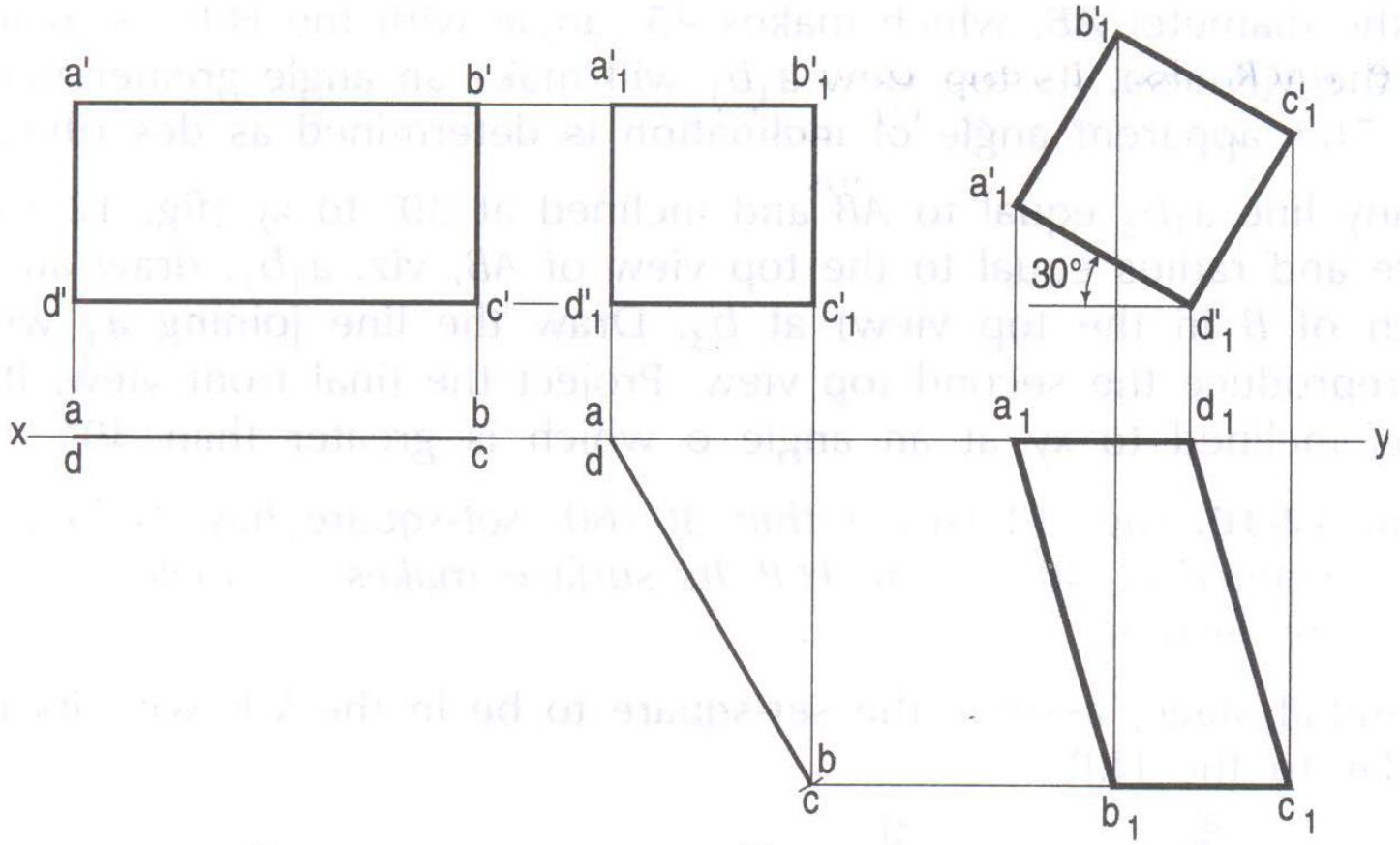
Projections of a Planar Features

Example-10 (Solved Pb. 12-10, pp. 265) …

Projections of a Planar Features

Example-11 (Solved Pb. 12-11, pp. 265)

A thin rectangular plate of sides 60mm x 30mm has its shorter side in V.P. and inclined at 30° to H.P. Its front view is a square of 30mm side. Draw its projections.



Will aux. view make it easier?

Projections of a Planar Features

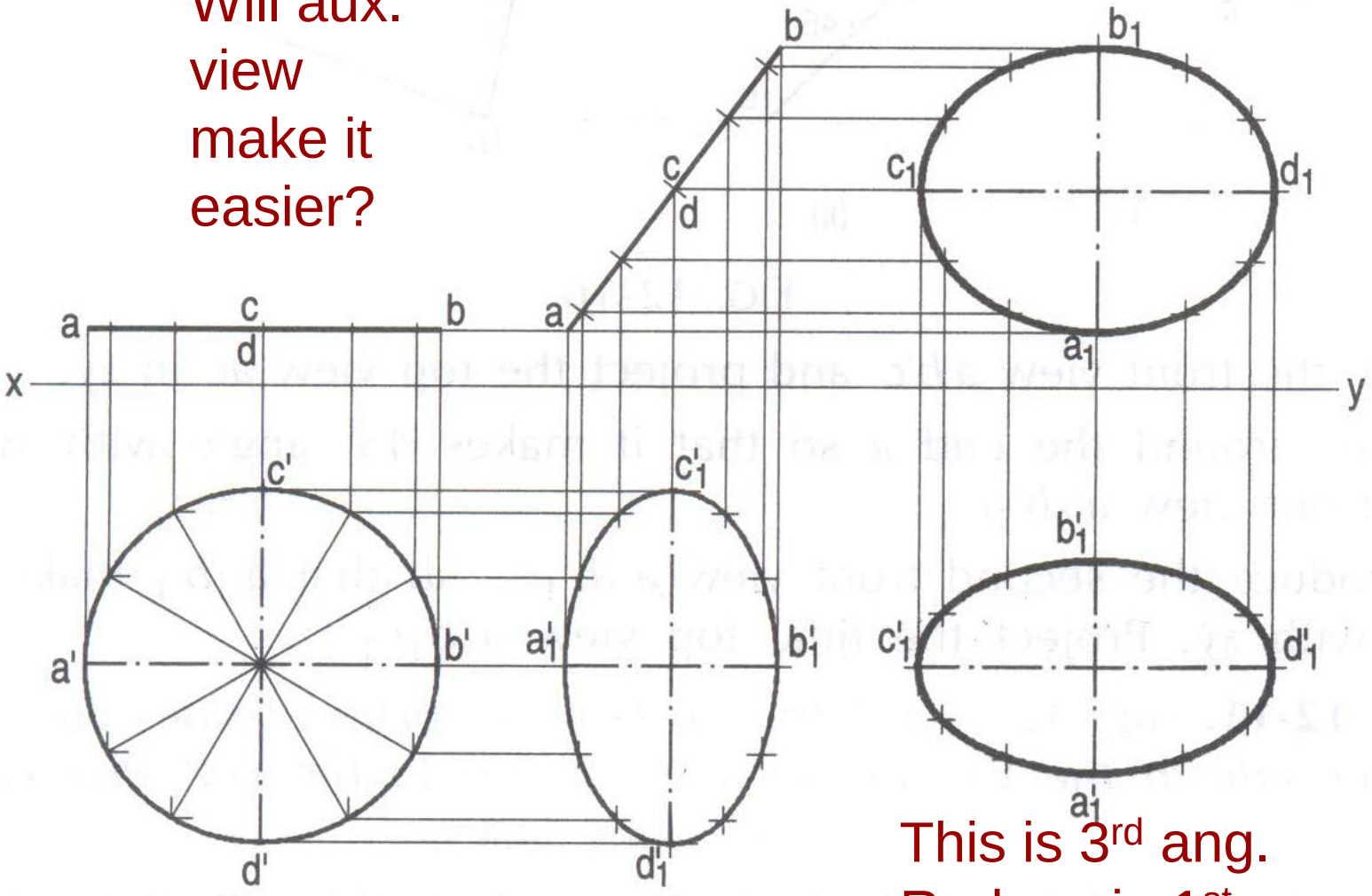
Example-11 (Solved Pb. 12-11, pp. 265) …

Projections of a Planar Features

Example-12 (Solved Pb. 12-12, pp. 266)

A circular plate of 50mm diameter and negligible thickness appears in the front view as an ellipse of 50mm major axis and 30mm minor axis. The major axis is horizontal. Draw its projections.

Will aux. view make it easier?



This is 3rd ang.
Redraw in 1st ang.

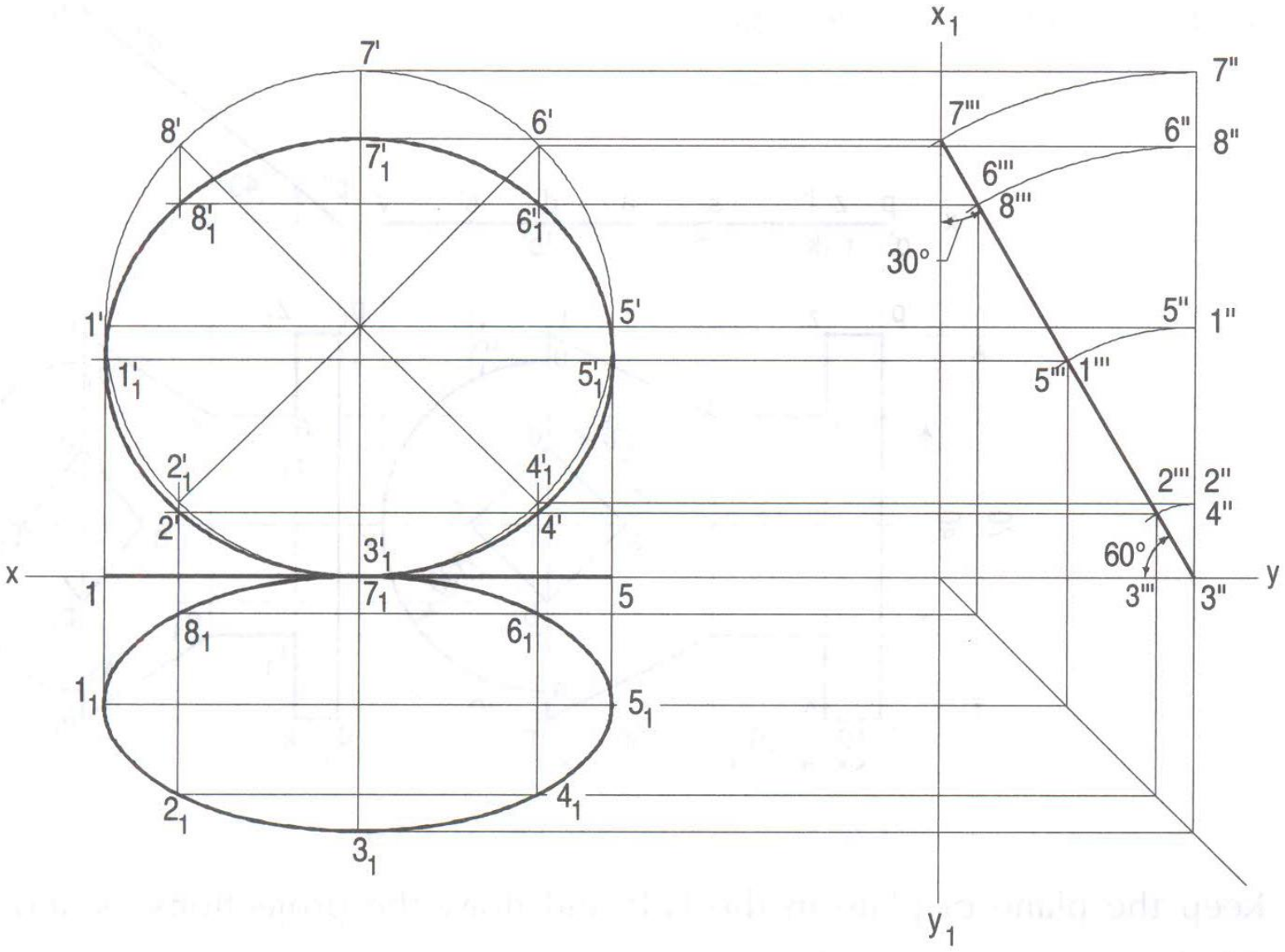
Projections of a Planar Features

Example-12 (Solved Pb. 12-12, pp. 266) …

Projections of a Planar Features

Example-15 (Solved Pb. 12-15, pp. 268)

A thin circular plate of 70mm diameter is resting on its circumference such that its plane is inclined at 60° to H.P. and 30° to V.P. Draw its projections.



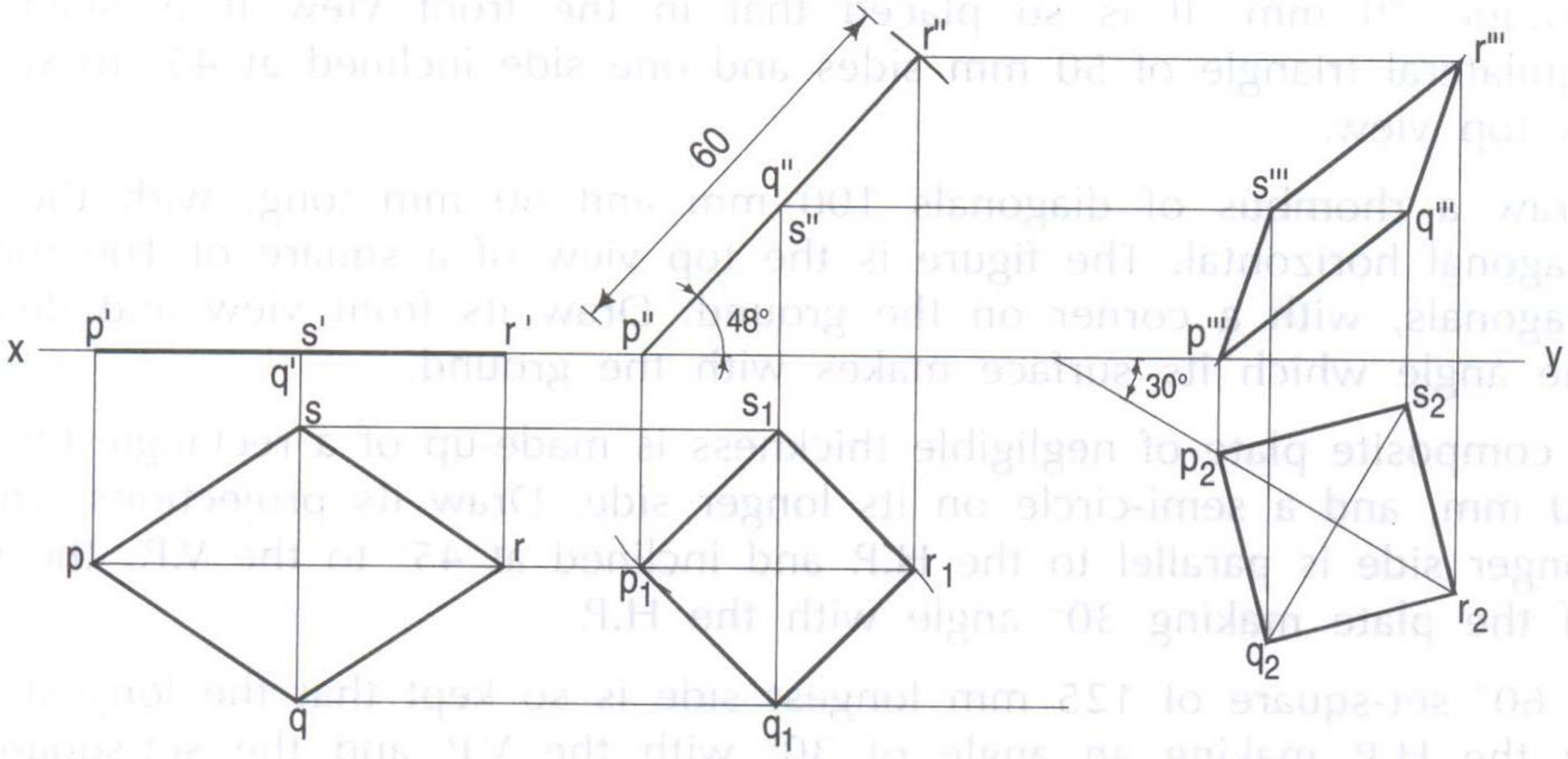
Projections of a Planar Features

Example-16 (Solved Pb. 12-16, pp. 268)

PQRS is a rhombus having diagonal PR=60mm and QS=40mm. Both the diagonals are mutually perpendicular. The plane of the rhombus is inclined to H.P. such that its top view appear as a square. The top view of PR makes 30° with *xy*. Draw its projections and determine its inclination with H.P.

Projections of a Planar Features

Example-16 (Solved Pb. 12-16, pp. 268) …



Auxiliary view method

Projections of a Planar Features

Example-16 (Solved Pb. 12-16, pp. 268) …

Projections of a Planar Features

Example-16a (Solved Pb. 12-16, pp. 268)

PQRS is a rhombus having diagonal PR=60mm and QS=40mm. Both the diagonals are mutually perpendicular. The plane of the rhombus is inclined to H.P. such that its top view appear as a square. The top view of PR makes 30° with V.P. Draw its projections and determine its inclination with H.P.

Note: This problem differs from the previous one in the way inclination with VP is defined – in one case, the angle is w.r.t. xy and it is w.r.t. V.P. in the other.

Projections of a Planar Features

Example-16a (Solved Pb. 12-16, pp. 268) …

Conclusions

- Roughly work out all the problems given to you. Only if you come prepared, you will be able to complete all problems of the sheet in the drawing session.

Thank You!