visualization, modeling, and graphics for
ENGINEERING DESIGN

Chapter 12

Pictorial Views

Objectives

- Explain the importance of pictorial drawings as an aid in visualization
- Create an isometric drawing of an object composed of principal, inclined, and oblique surfaces
- Draw ellipses on the front, top, and right faces of the isometric to represent cylinders and holes

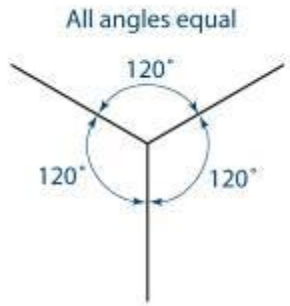
Objectives (cont'd.)

- Explain the difference between a cavalier and cabinet oblique drawing
- Create an oblique drawing given the orthographic drawing of an object
- Create a two-point perspective drawing given the orientation of the plan view and the location of the elevation view

Introduction

- Pictorial drawings can help visualize a 3-D object
- Also important when assembling parts into mechanisms or purchasing replacement parts
- Not used as working drawings
- Many types and variations

Axonometric Drawings



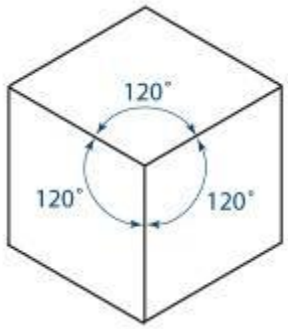
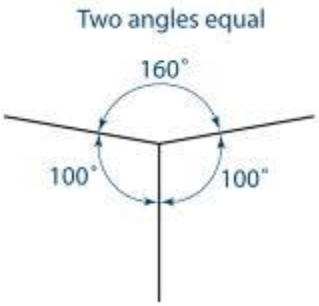


FIGURE 12.03. Three visible normal surfaces (frontal, horizontal, and profile) of a prism have equal angles between them (120˚) in an isometric drawing.



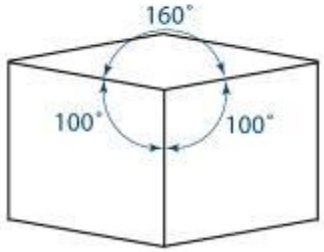


FIGURE 12.04. In a diametric drawing, two of the three visible normal surfaces (frontal and profile) of a prism have edges presented at equal angles, not equal to 120˚ .

Axonometric Drawings (cont'd.)

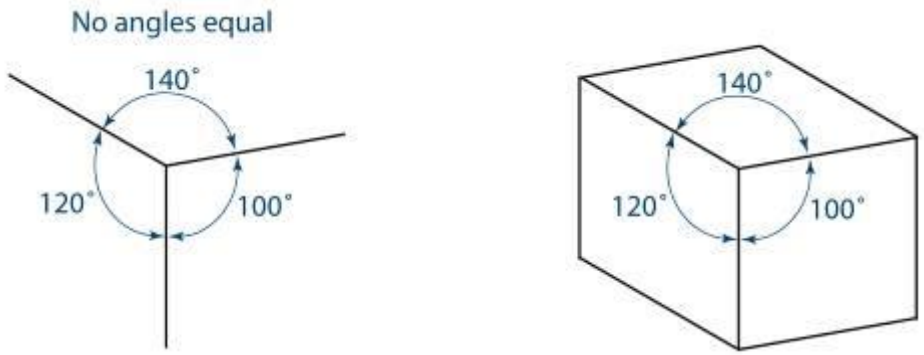


FIGURE 12.05. A trimetric drawing presents the three visible normal surfaces (frontal, horizontal, and profile) of a prism in a position where none of the angles between the surface edges is equal.

Isometric Drawing

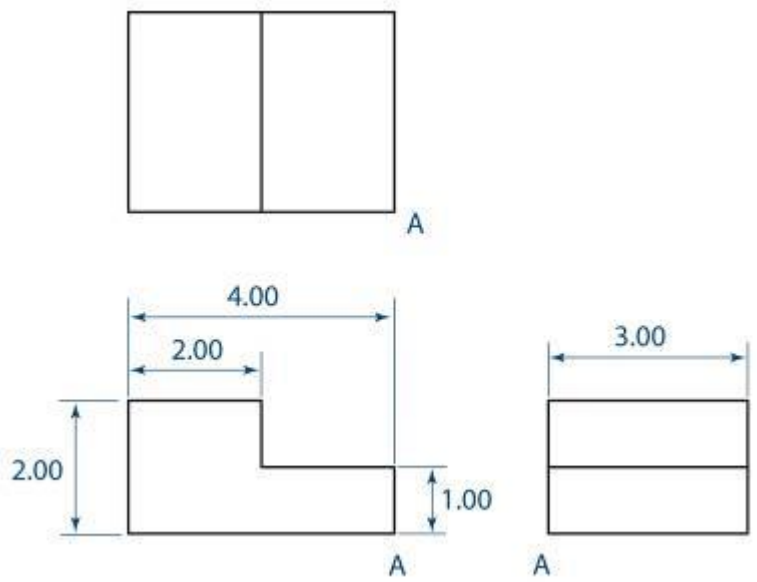


FIGURE 12.06. Orthographic views of a step block.

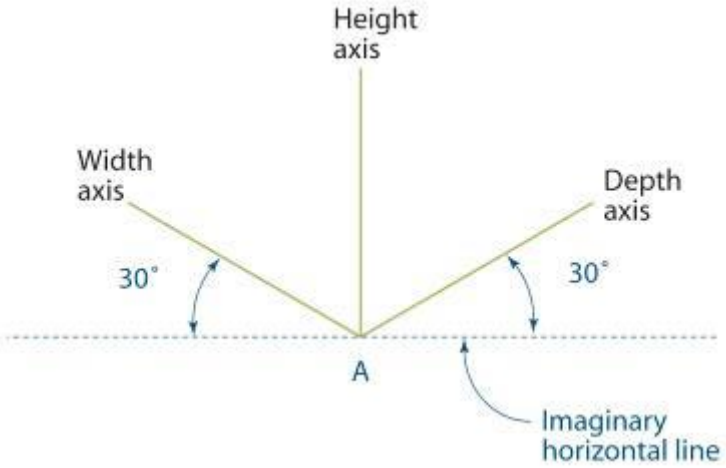


FIGURE 12.07. The isometric axes.

Isometric Drawing (cont'd.)

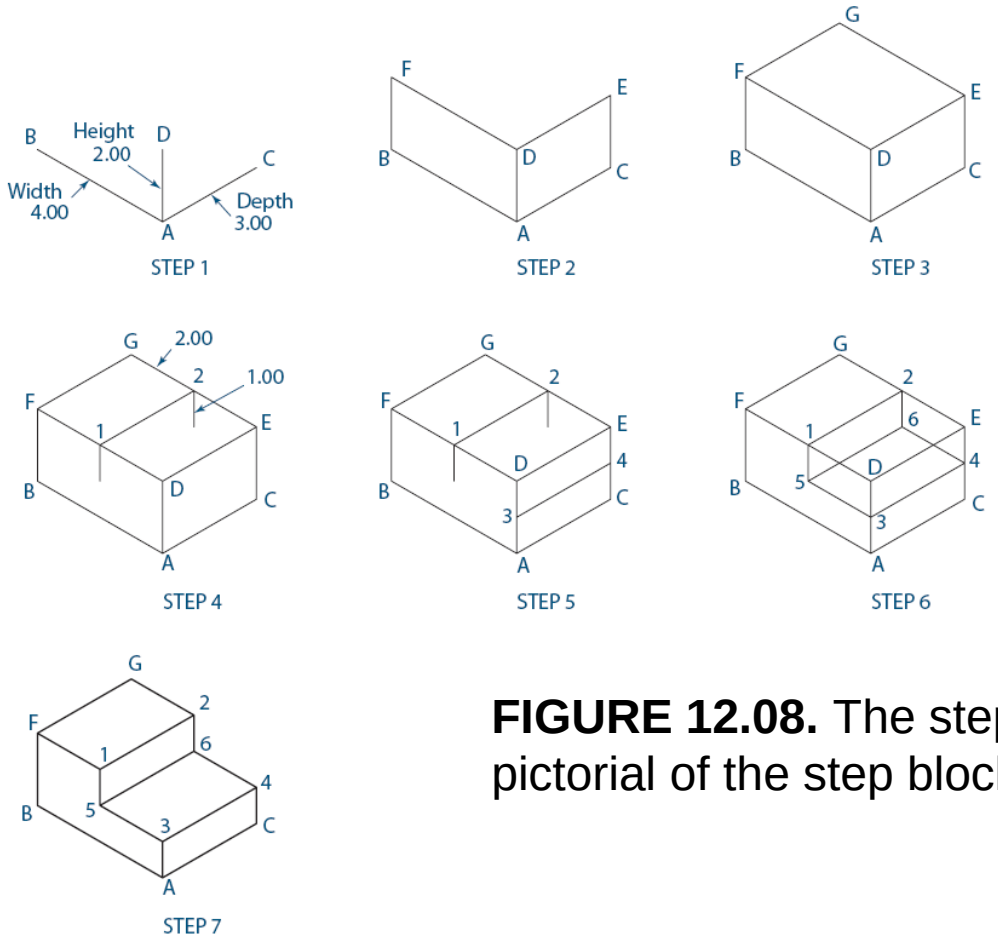


FIGURE 12.08. The steps to draw an isometric pictorial of the step block.

Inclined Surfaces

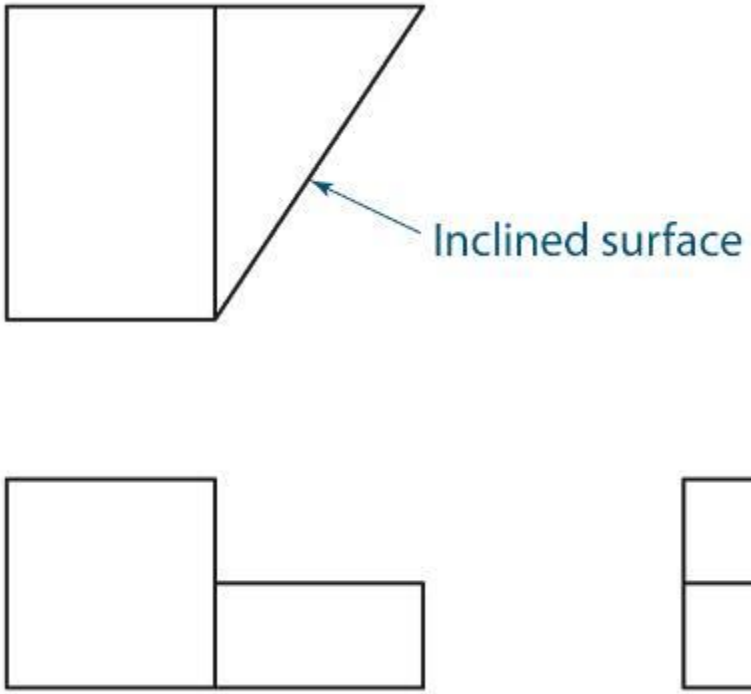


FIGURE 12.09.
Orthographic views of a step block with an inclined surface.

Inclined Surfaces (cont'd.)

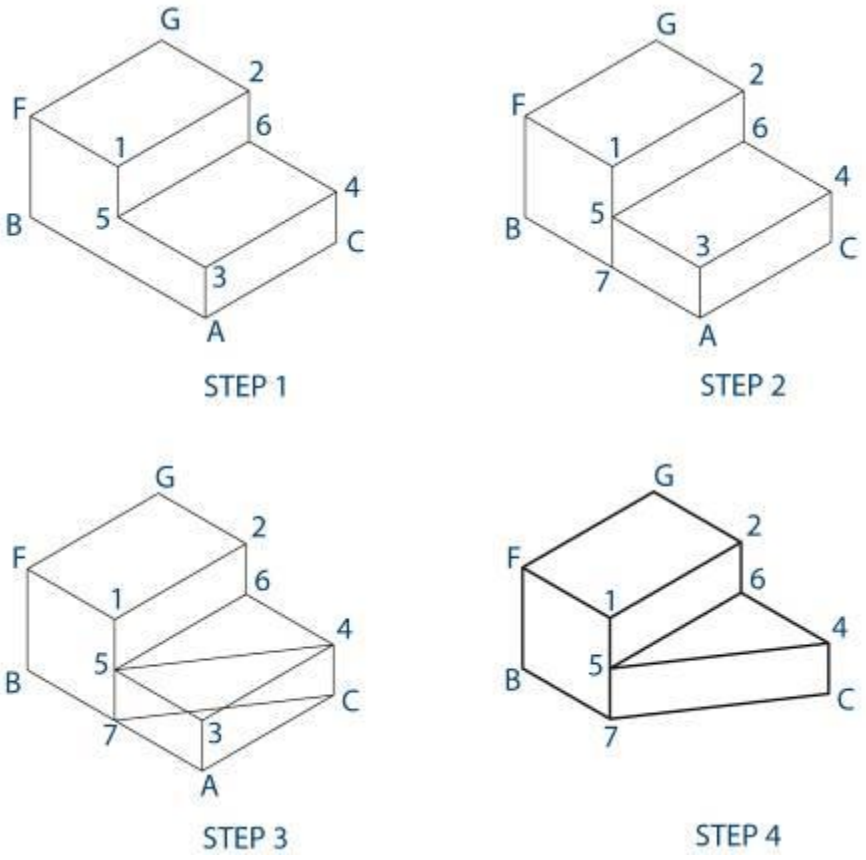


FIGURE 12.10. The step involved to create an isometric pictorial of a step block with an inclined surface.

Oblique Surfaces

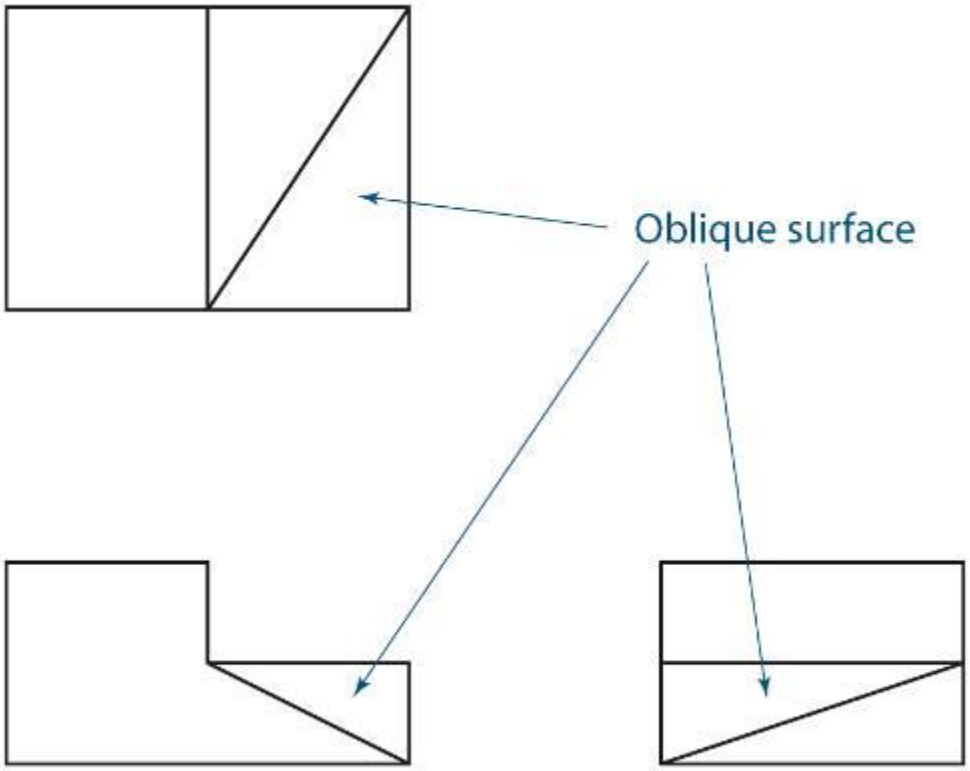


FIGURE 12.11. Orthographic views of a step block with an oblique surface.

Oblique Surfaces (cont'd.)

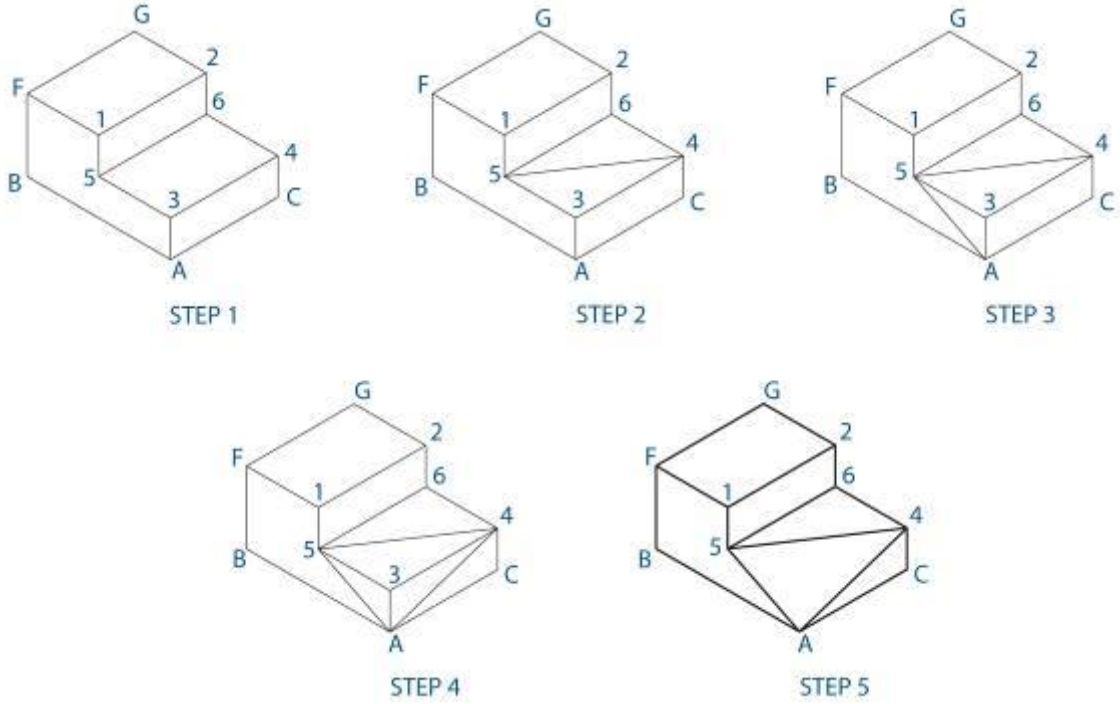


FIGURE 12.12. The steps involved to create an isometric pictorial of a step block with an oblique surface.

Cylindrical Surfaces

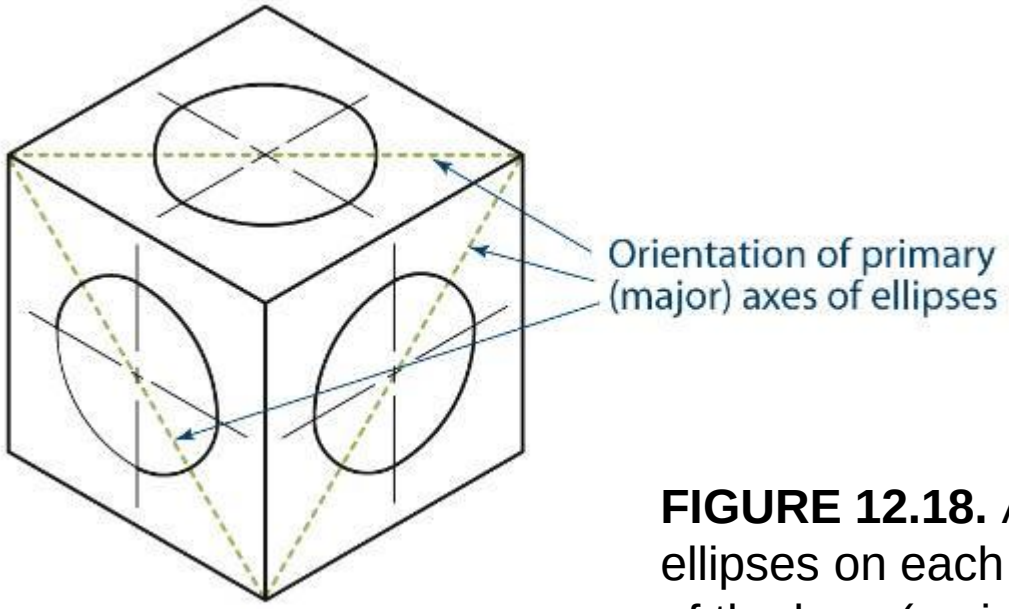


FIGURE 12.18. An isometric cube showing ellipses on each face. Note the orientation of the long (major) axis for the ellipse on each of the three normal faces.

Cylindrical Surfaces (cont'd.)

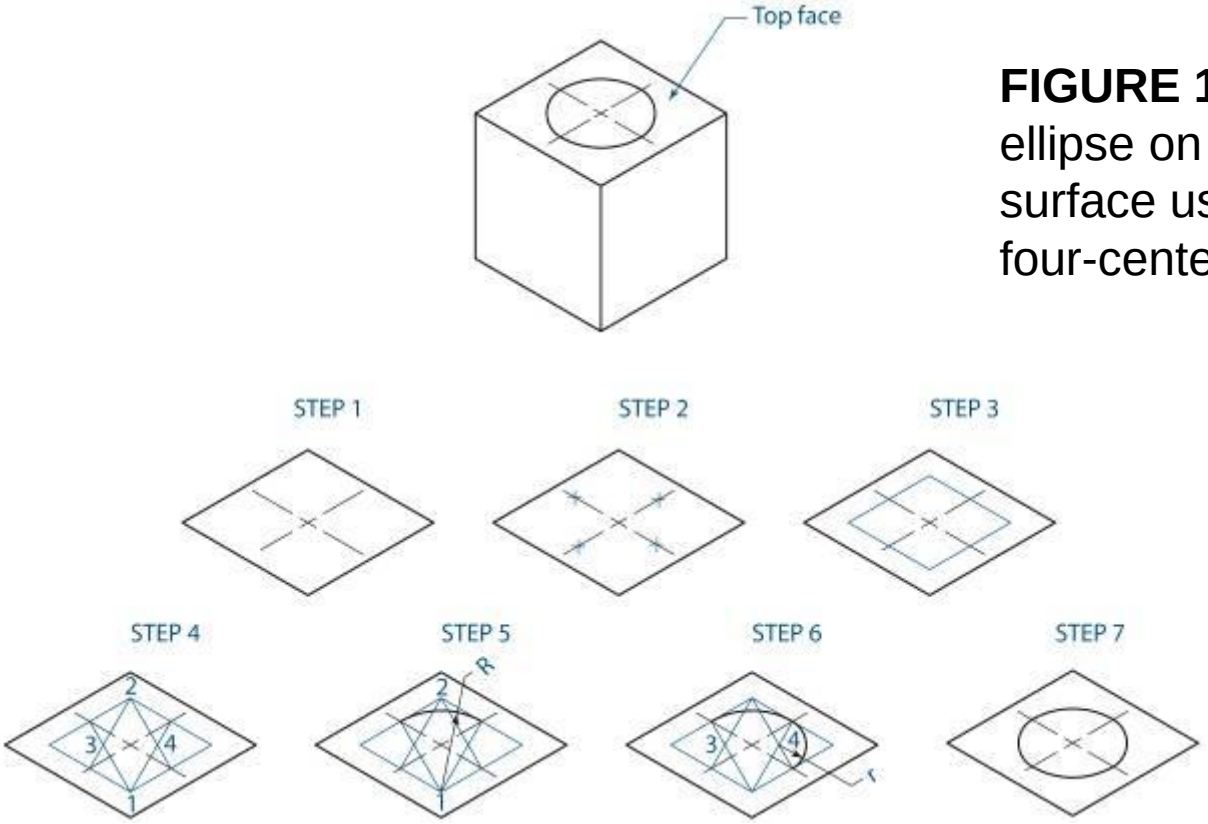


FIGURE 12.19. Drawing an ellipse on the top isometric surface using the traditional four-center method.

Cylindrical Surfaces (cont'd.)

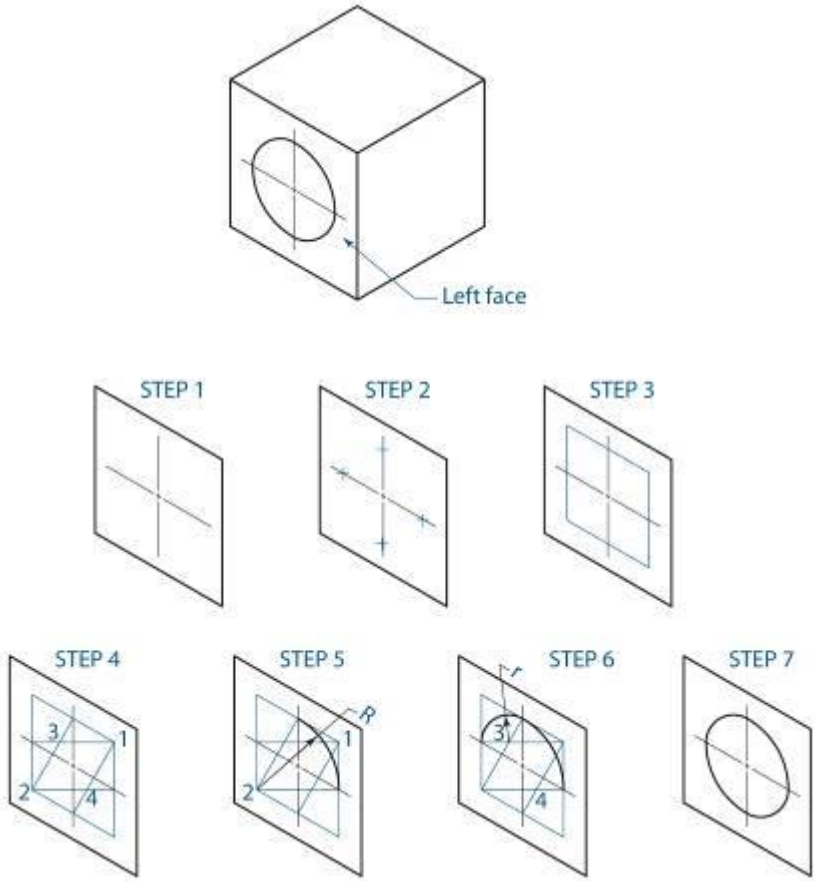


FIGURE 12.21. Drawing an ellipse on the left isometric surface using the traditional four-center method.

Ellipses on Inclined Surfaces

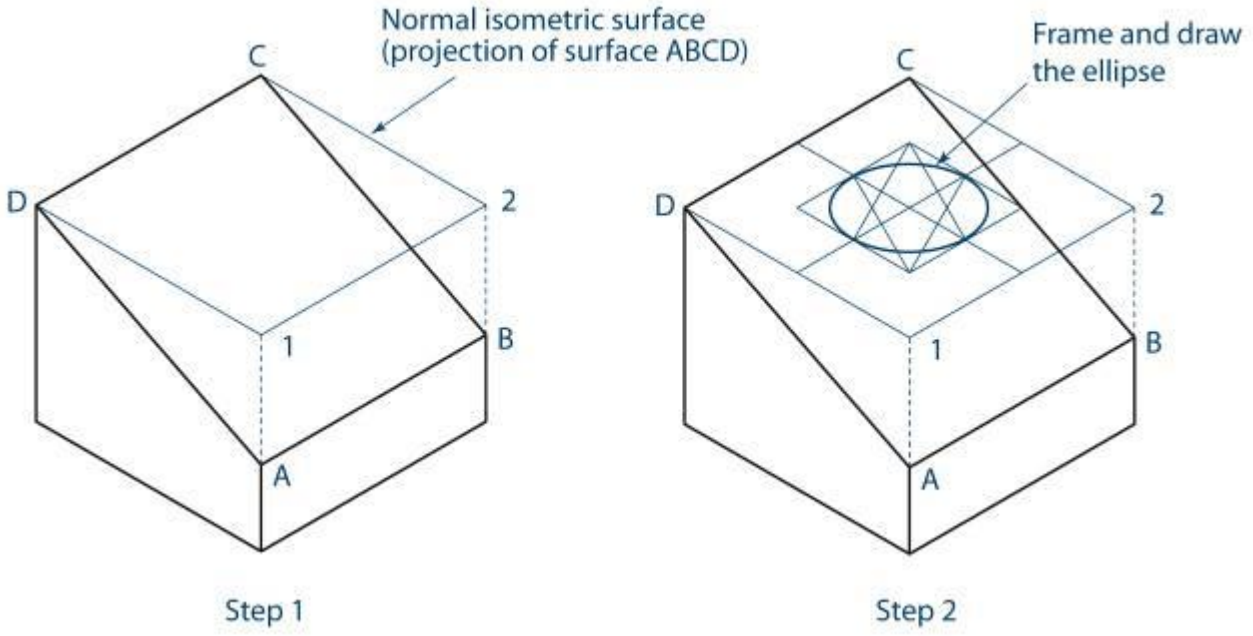


FIGURE 12.24. Steps 1 and 2 to create an isometric pictorial showing a vertical circular hole in an inclined surface.

Ellipses on Inclined Surfaces (cont'd.)

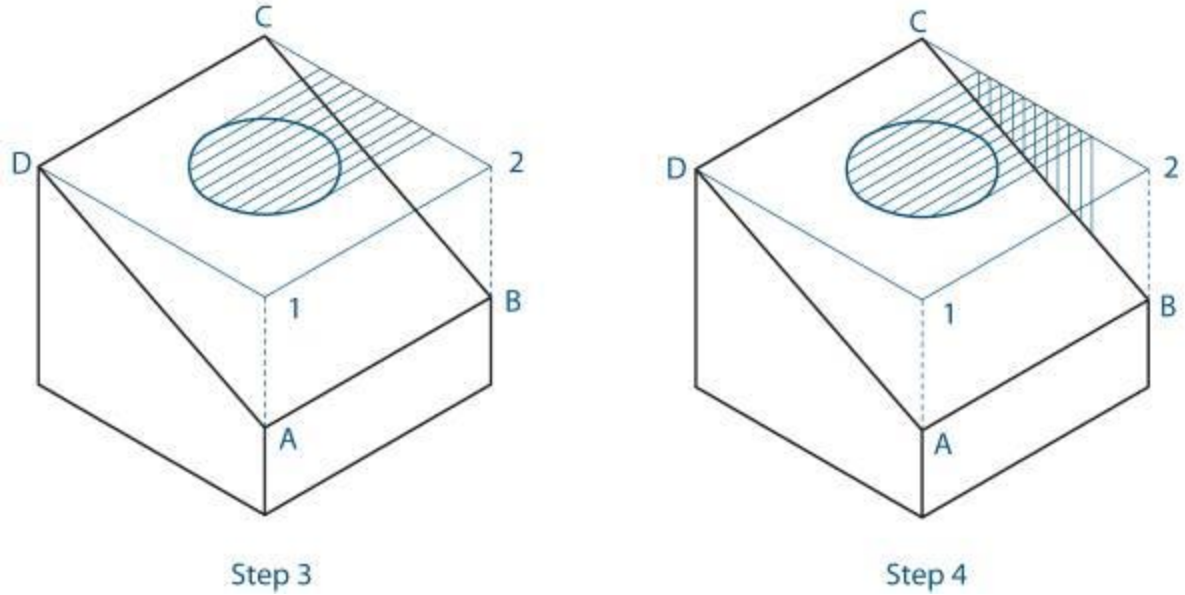


FIGURE 12.25. Steps 3 and 4 to create an isometric pictorial showing a vertical circular hole in an inclined surface.

Ellipses on Inclined Surfaces (cont'd.)

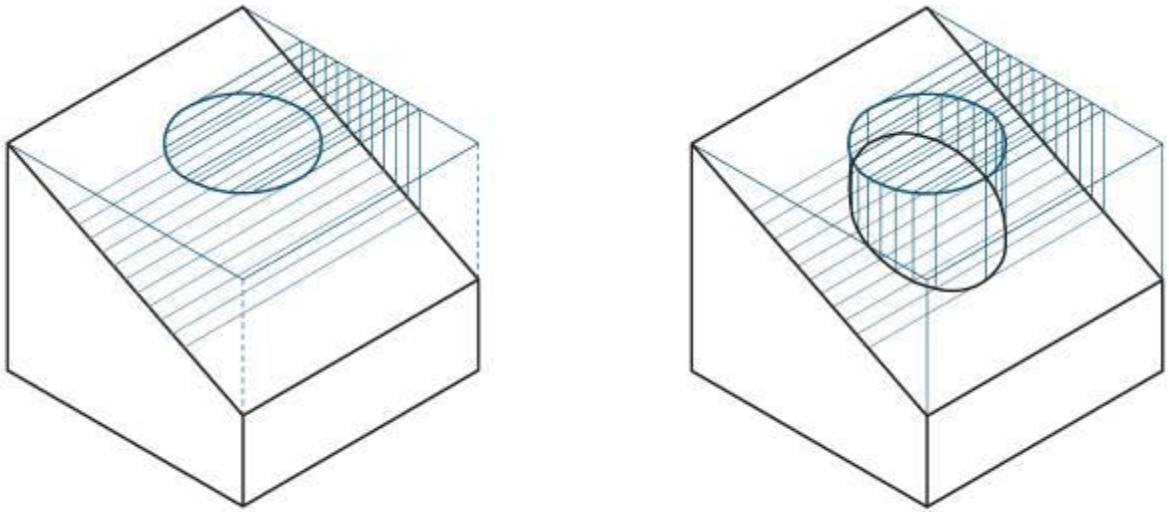


FIGURE 12.26. Steps 5 and 6 to create an isometric pictorial showing a vertical circular hole in an inclined surface.

Ellipses on Inclined Surfaces (cont'd.)

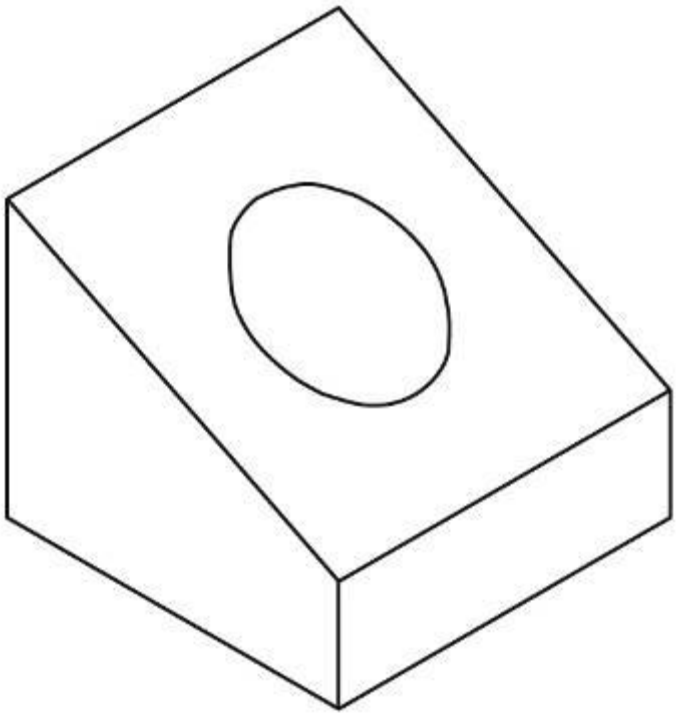


FIGURE 12.27. The finished construction of the vertical circular hole in an inclined surface.

Oblique Drawings

- Types of oblique drawings

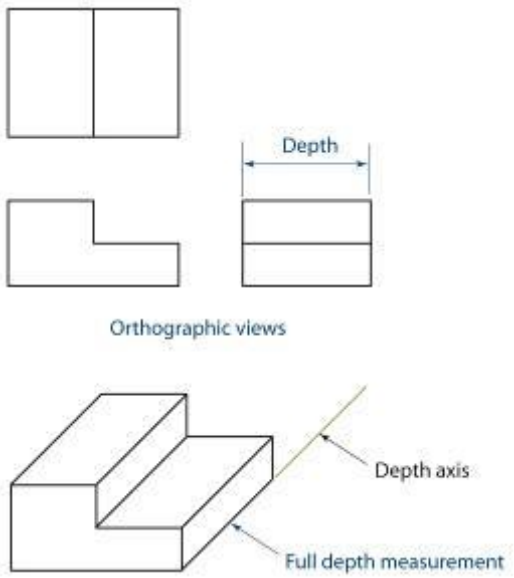


FIGURE 12.29. A cavalier oblique pictorial.

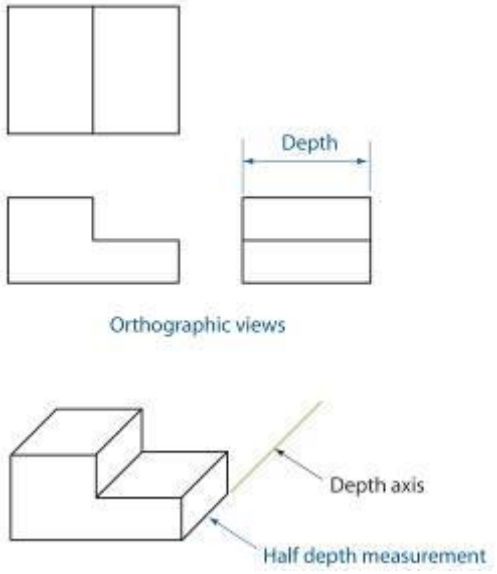
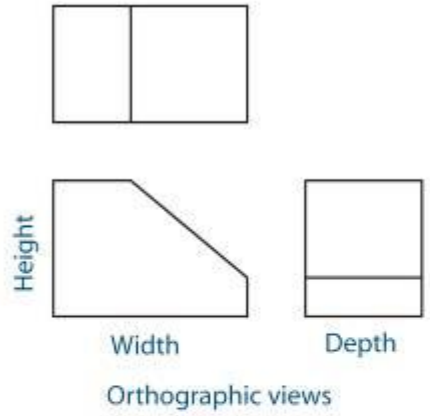


FIGURE 12.30. A cabinet oblique pictorial.

Construction of Oblique Drawings



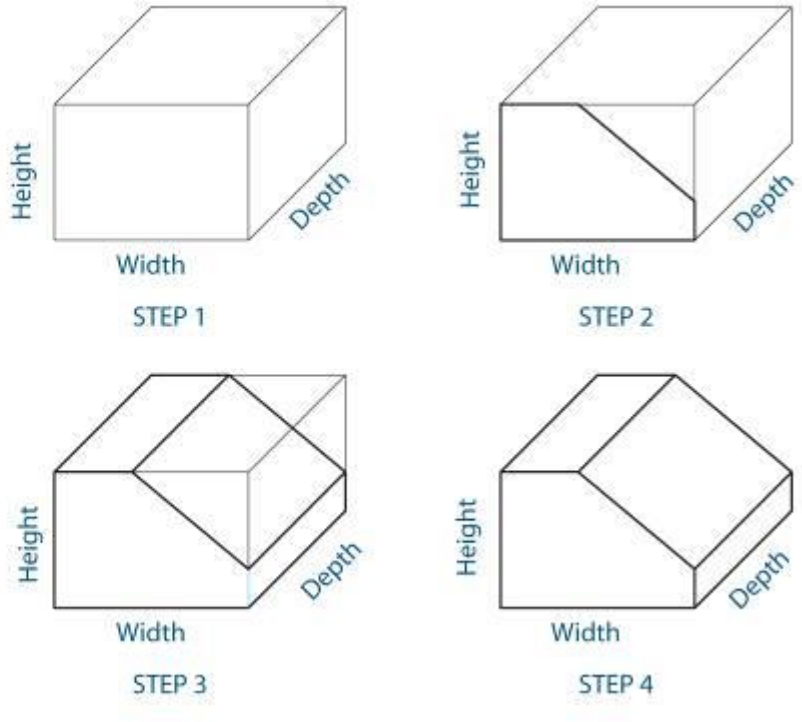


FIGURE 12.31. The steps required to construct an oblique pictorial.

Construction of an Object with Circular Features

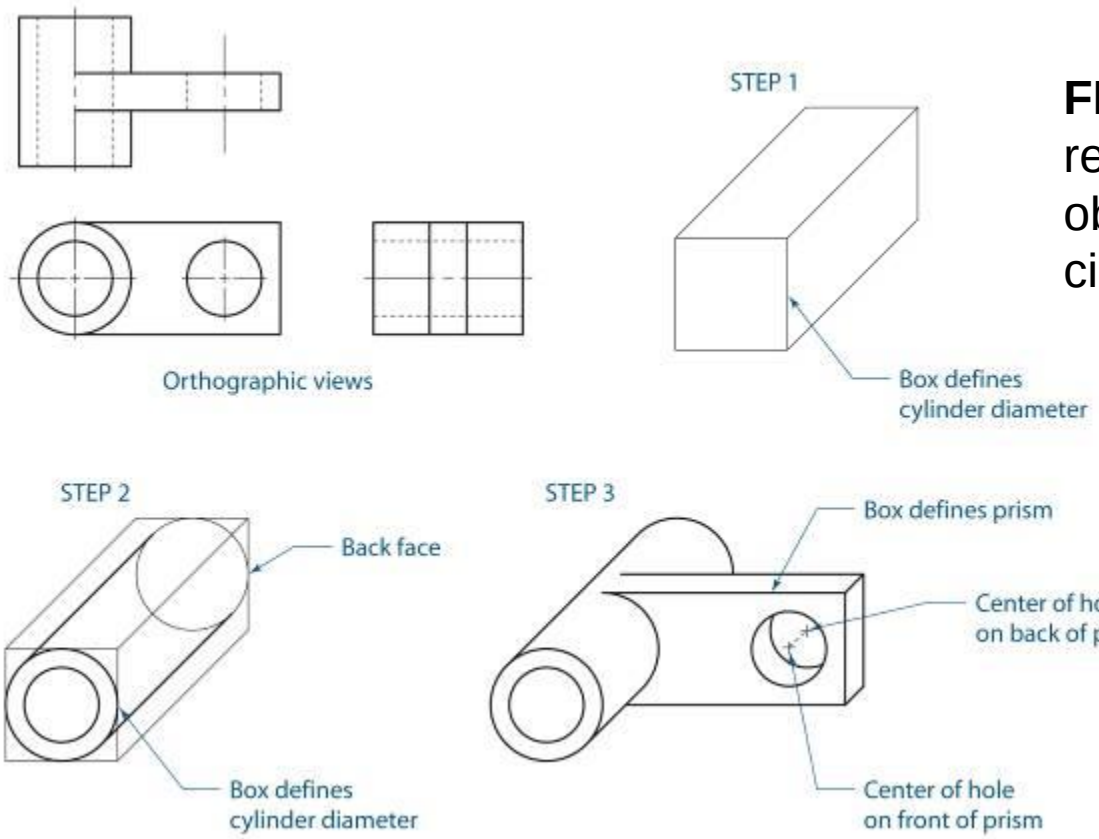


FIGURE 12.32. The steps required to construct an oblique pictorial with circular features.

Perspective Drawings

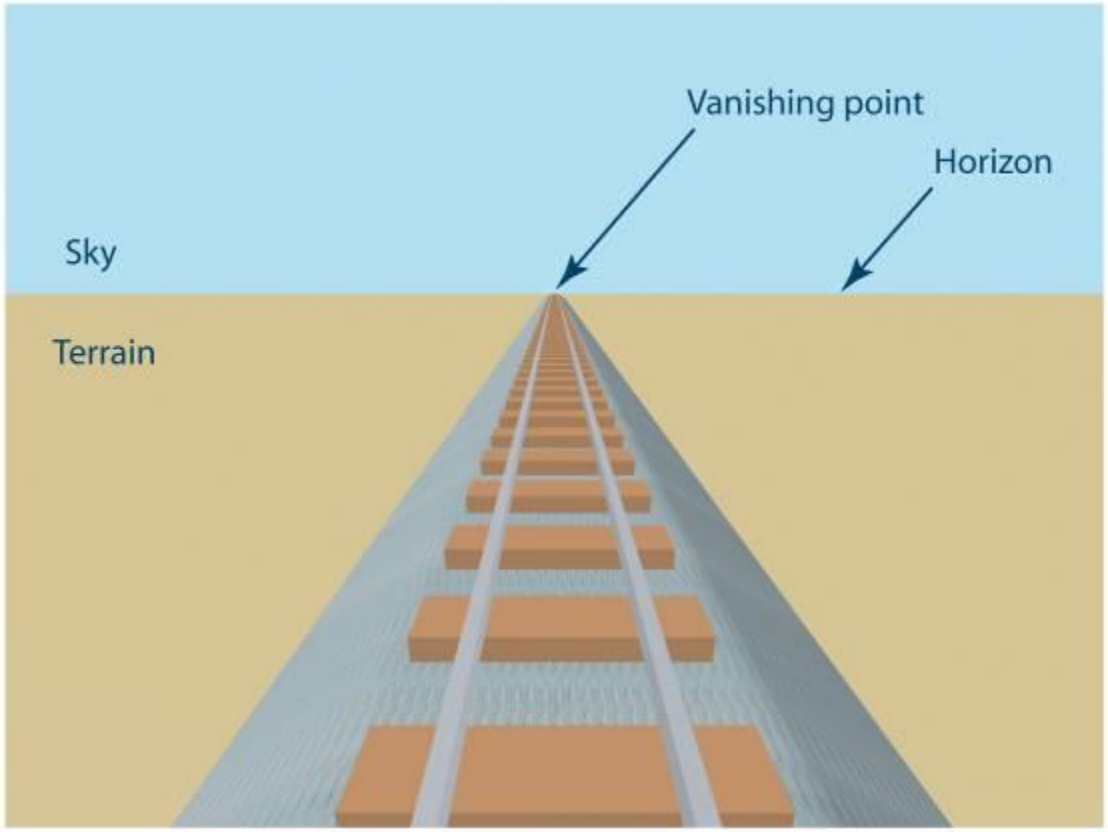


FIGURE 12.33. An illustration showing railroad tracks converging to a vanishing point on the horizon.

Types of Perspective Drawings

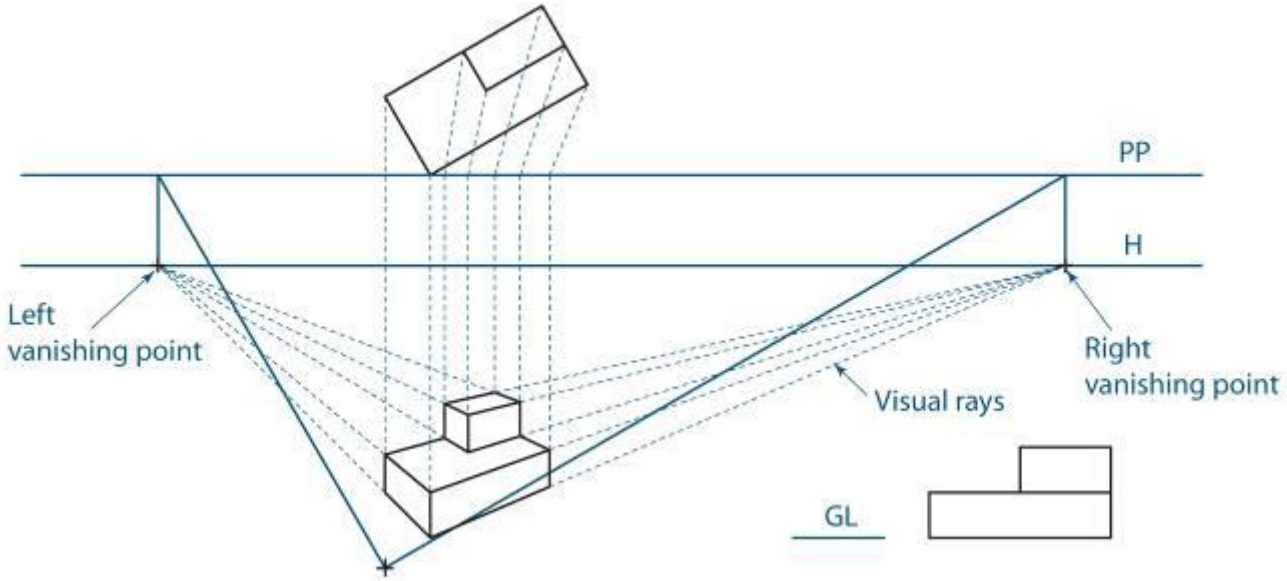


FIGURE 12.34. An example of a two-point perspective drawing.

Types of Perspective Drawings (cont'd.)

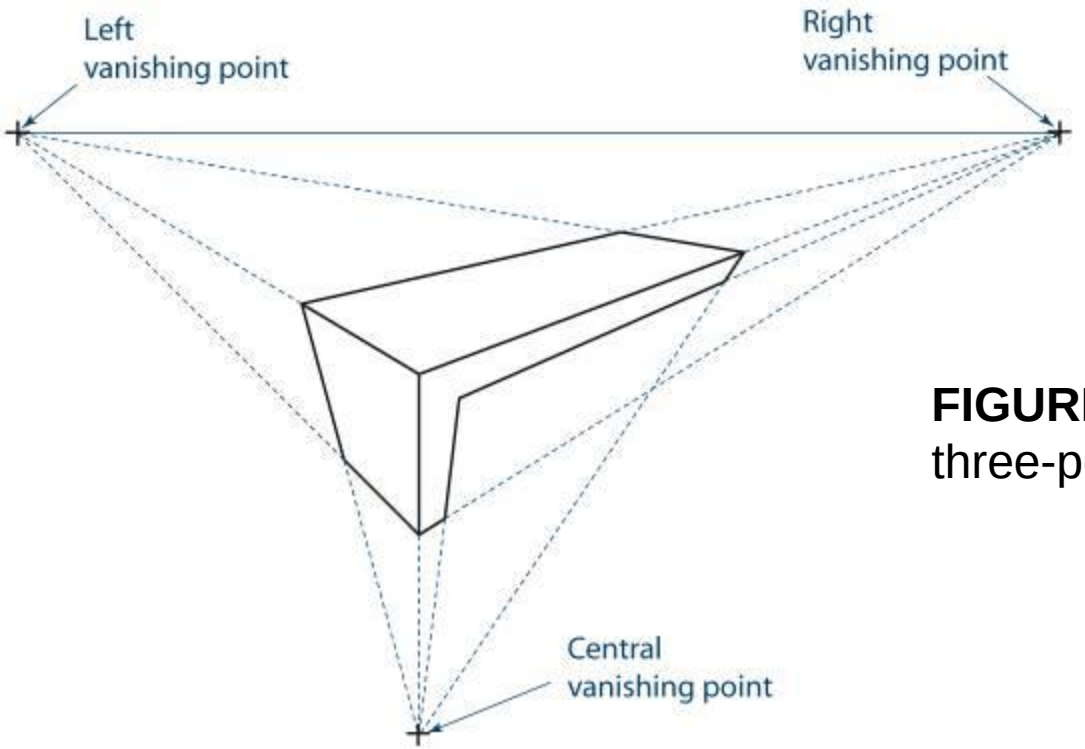


FIGURE 12.35. An example of a three-point perspective drawing.

Two-Point Perspective Drawings

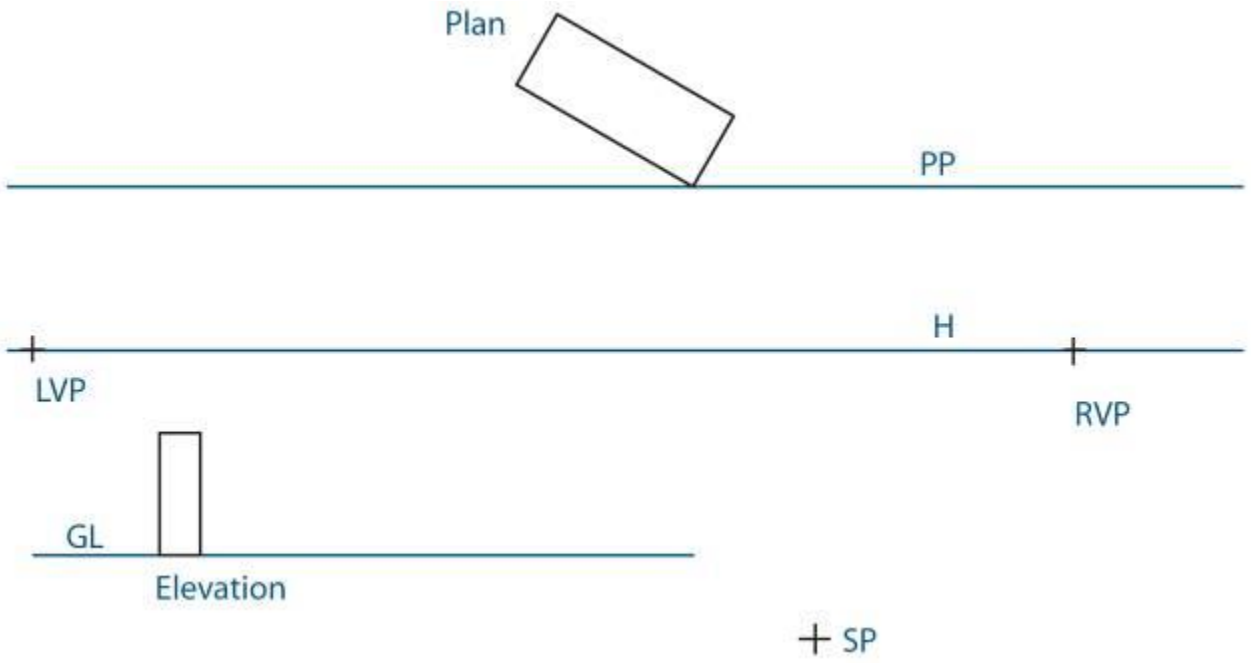


FIGURE 12.36. The relationship between the PP and the object.

Construction of a Two-Point Perspective Drawing

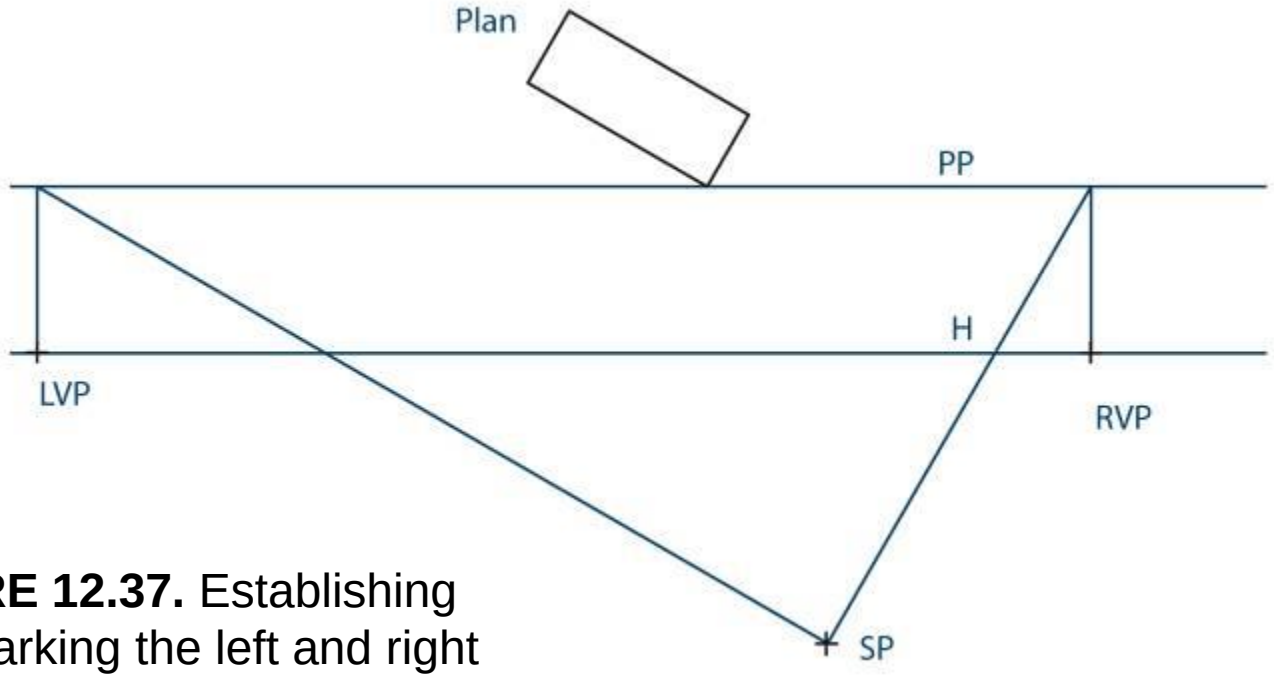


FIGURE 12.37. Establishing and marking the left and right vanishing points.

Construction of a Two-Point Perspective Drawing (cont'd.)

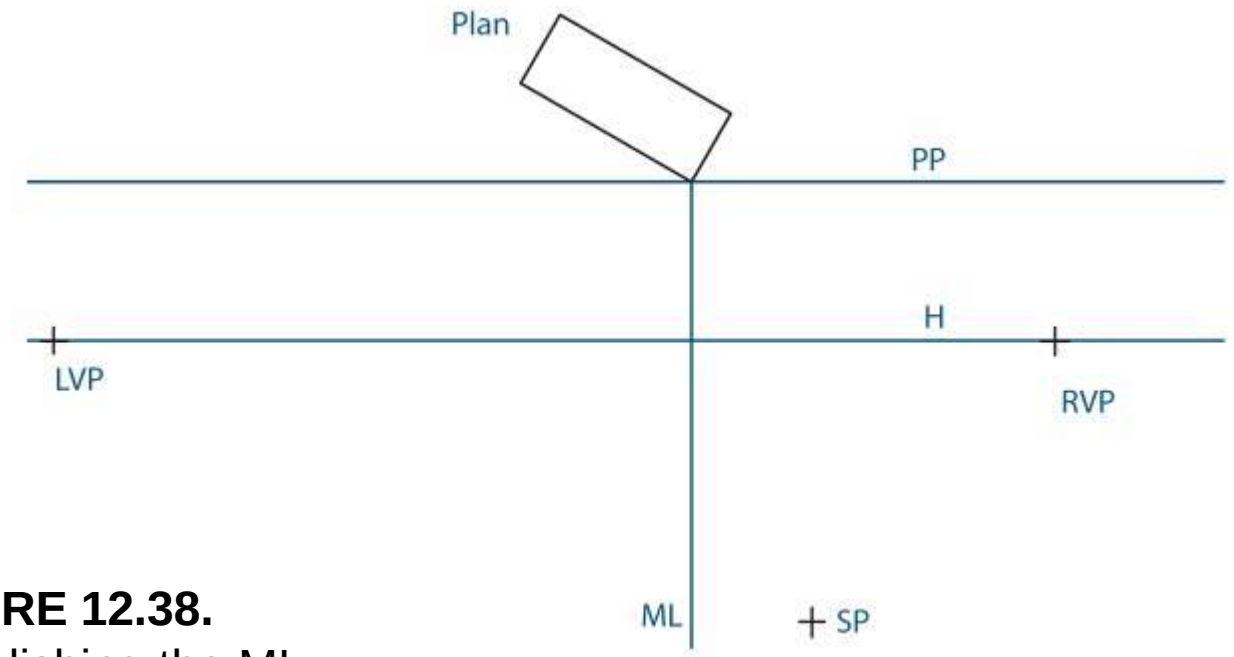


FIGURE 12.38.
Establishing the ML.

Construction of a Two-Point Perspective Drawing (cont'd.)

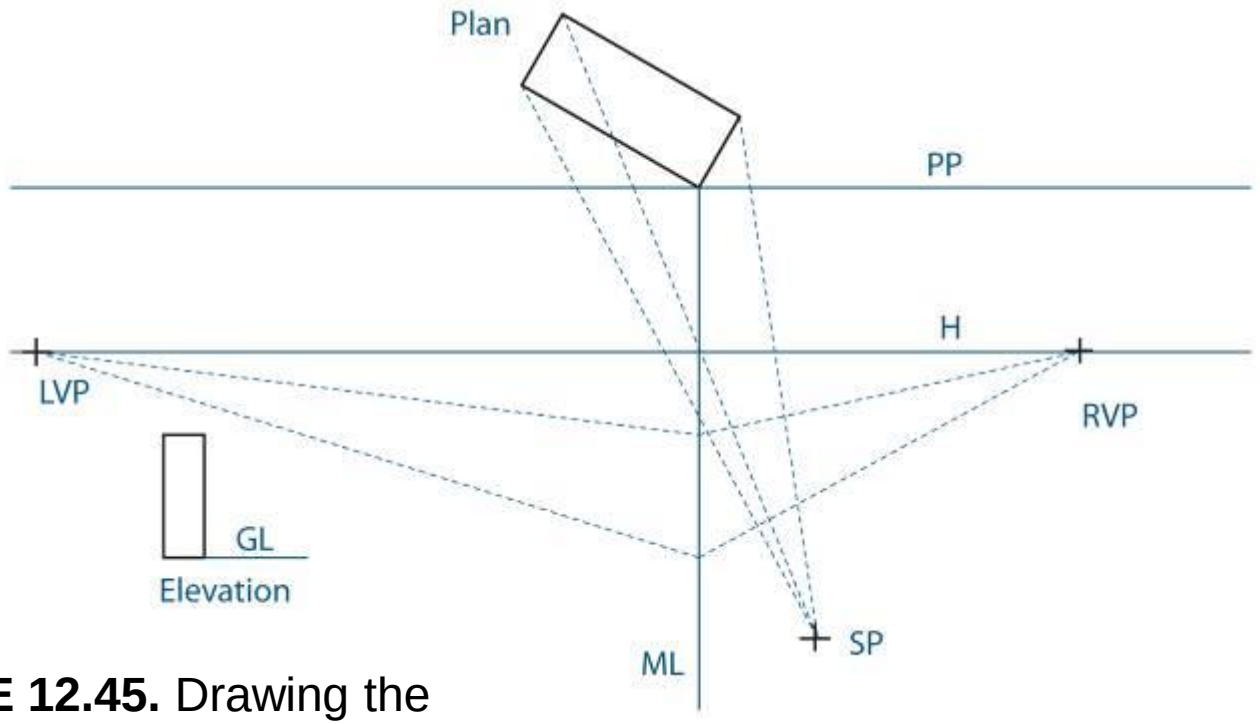


FIGURE 12.45. Drawing the visual rays of the object to the PP through the SP.

Construction of a Two-Point Perspective Drawing (cont'd.)

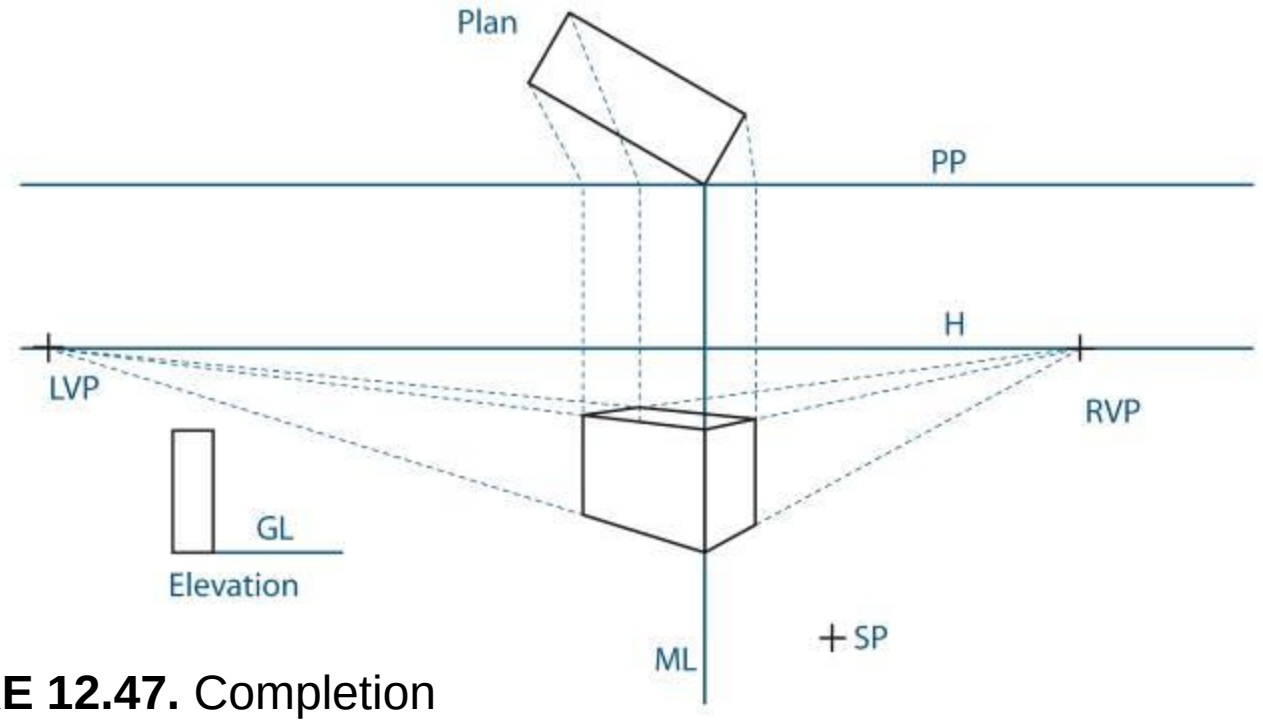


FIGURE 12.47. Completion of the perspective.

Complex Object in Two-Point Perspective

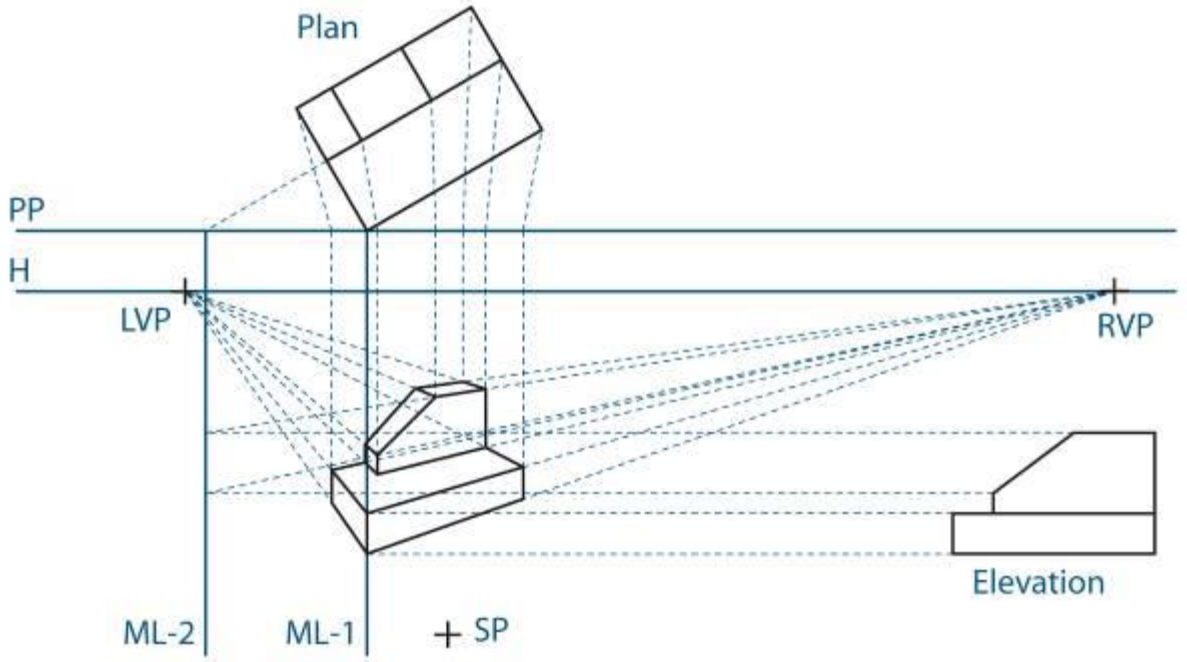


FIGURE 12.48. A two-point perspective drawing of a complex object.

Considerations for 3-D Modeling

- Easiest way to create pictorial drawings is to extract from solid models
  - Usually matter of specifying viewing orientation and amount of perspective
  - Very easy to extract

Summary

- Used pictorial drawings for visualization and understanding 3-D relationships of objects
- Created isometric drawings for simple communication

Summary (cont'd.)

- Introduced oblique drawings, which are very quickly and simply created
- Used perspective drawings for applications that demand the most realistic appearance