

UNIT F: AUXILIARY VIEWS

Competency: D406.00

Prepare primary auxiliary views.

Objective: D406.01

Explain the concepts and principles of primary auxiliary views.

Introduction: The purpose of this unit is to give the student the understanding of the basic concepts of primary auxiliary views. There are times when one of the six principal views will not completely describe an object. This is especially true when there are inclined planes or features on an object. For these cases, a special orthographic view called an auxiliary view can be created. Auxiliary views are supplemental views added to a multiview drawing that contain inclined surfaces. They are used to find the edge and true shape views of inclined or angled surfaces. This unit describes how to create auxiliary views for objects that cannot be clearly represented by the six principal views. Also described is the use of auxiliary views to solve geometry problems, such as the point and true-length views of lines and edges.

Instructors can take a couple of different approaches to this topic. You may elect to take the traditional 2D drawing approach where students use a 2D CAD program to construct an auxiliary view by transferring dimensions from the principal views. To better prepare students for a career in 3D modeling, require students to create a 3D solids model of the object first and then extract the multiview drawing (including the auxiliary view).

Explain the following:

- A. Terms and their relationship to Auxiliary Views: *R1(229-230); R2(316-319); R3(274-277)*
1. Inclined surfaces – A surface that's true size and shape cannot be viewed in frontal, horizontal, or profile planes.
 2. True size and shape – A surface that is perpendicular to the projection plane.
 3. Foreshortened surface – A surface that is not true size or not true shape.
 4. Primary auxiliary views - A single view that is projected from one of the six principal views. Named according to the principal dimensions of the object shown in the auxiliary view.
 5. Primary auxiliary views include:
 - a. Depth auxiliary – The inclined surface will appear foreshortened in a top view and a right-side view. The inclined surface will appear as a line or edge in the front view (see Figure 1).
 - b. Height auxiliary – The inclined surface will appear foreshortened in a front view and a right-side view. The inclined surface will appear as a line or edge in the top view (see Figure 2).
 - c. Width auxiliary – The inclined surface will appear foreshortened in a top view and a front view. The inclined surface will appear as a line or edge in the right or left-side view (see Figure 3).

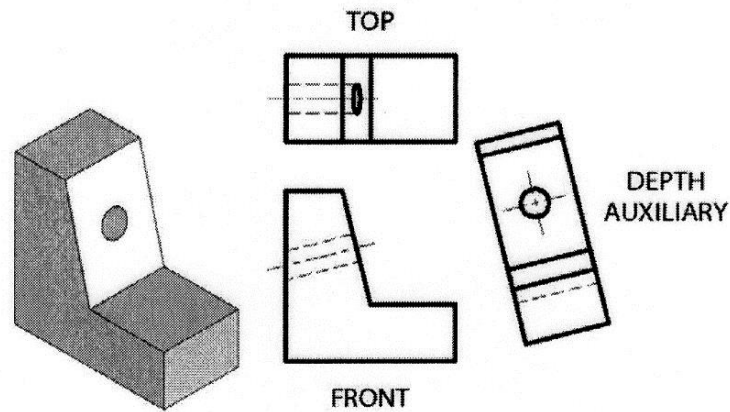


Figure 1. Depth Auxiliary.

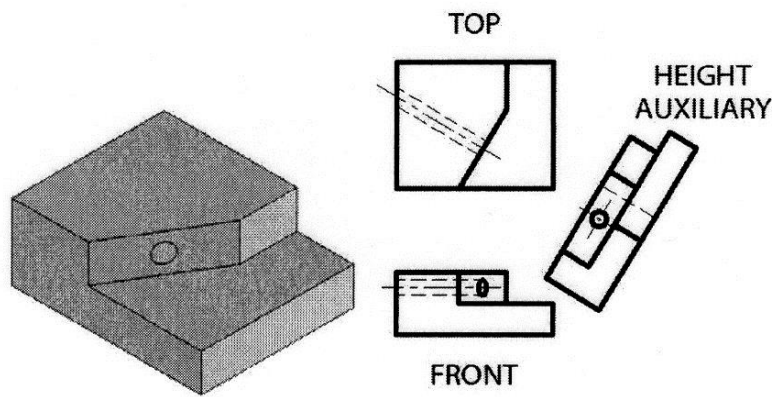


Figure 2. Height Auxiliary.

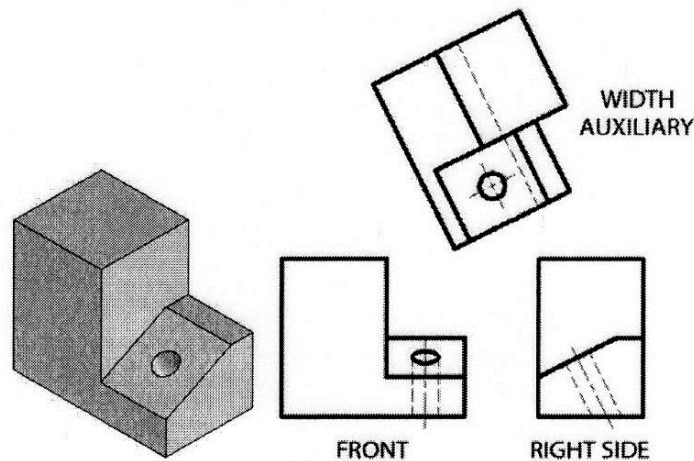


Figure 3. Width Auxiliary.

6. Reference Plane – A plane that is parallel to the inclined surfaces.
7. Auxiliary projection – An orthographic view that is drawn on any plane other than from frontal, horizontal, or profile plane.
8. Perpendicular – A surface that is perpendicular to the projection plane.

9. Partial auxiliary view – An auxiliary view that shows only the true size and shape of the inclined surface.
10. Line of sight "LOS"- Represents the direction you are looking at an object.
11. Reference line - Represents the intersection of two imaginary "projection planes"
12. Projection line - Shows the relationship of two views of a point.

B. Explain how to draw Primary Auxiliary Views: *R1(229-217); R2(276-282); R3(136-139)*

1. Auxiliary views are created by adding a "line of sight" (LOS), a "reference line" and "projection lines".
 - a. The "line of sight" must be perpendicular (90°) to any view of a line to find the "true length" (TL) of the line. The "line of sight" must be perpendicular (90°) to the "edge view of a surface" to find the "true shape" (TS) of the surface.
 - b. "Reference Lines" are drawn as a "phantom lines" (long, short, short, long) and at 90° angles to the "LOS".
 - c. "Projection Lines" are drawn as "dashed lines" and at 90° angles to "reference lines". Horizontal/Frontal) (Frontal/Profile) (Horizontal/Auxiliary Elevation) (Frontal/Auxiliary Inclined) and is used to measure distances from the planes to points on an object.
2. Hidden lines are typically not used in auxiliary views, unless needed for clarity. Also, a number of surfaces are not included because they are distorted and are of little value.
3. Typical steps followed to construct an auxiliary view:
 - a. Select the face that is to be drawn
 - i) A true surface
 - ii) A true length line
 - iii) An end view of a line.
 - b. Decide which line or surface is to be shown in an auxiliary view and which orthographic view it will be projected from. The following facts must be considered when rendering this decision:
 - i) Width auxiliary views are always projected from a side view.
 - ii) Depth auxiliary views are always projected from a front view (Figure 4).
 - iii) An elevation or height auxiliary view is always projected from the top view.

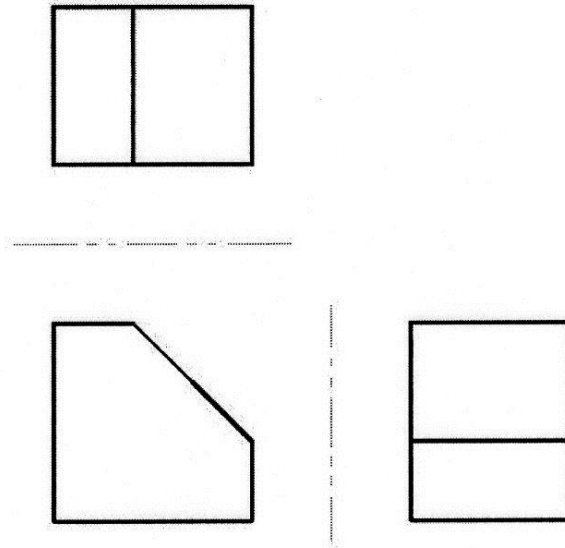


Figure 4. Inclined Surface as an Edge in the Front View.

- c. Draw construction lines perpendicular to the surface/line/point of interest. These lines should go in a direction, and far enough that leaves enough space for the view (Figure 5).

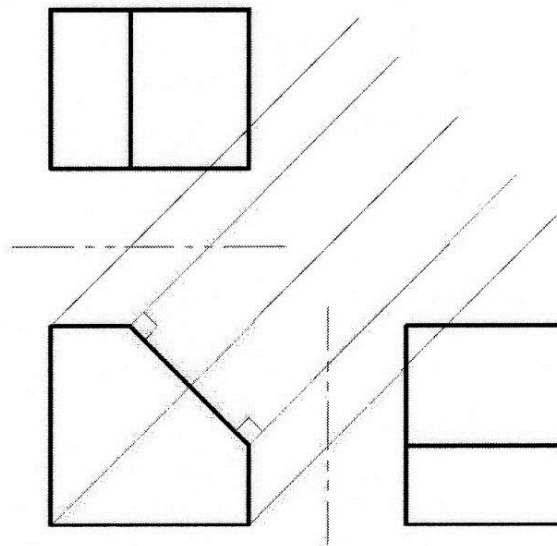


Figure 5. Projecting Lines Perpendicular to Inclined Surface.

- d. Draw a folding line at an appropriate distance. This will act as a reference plane (Figure 6).

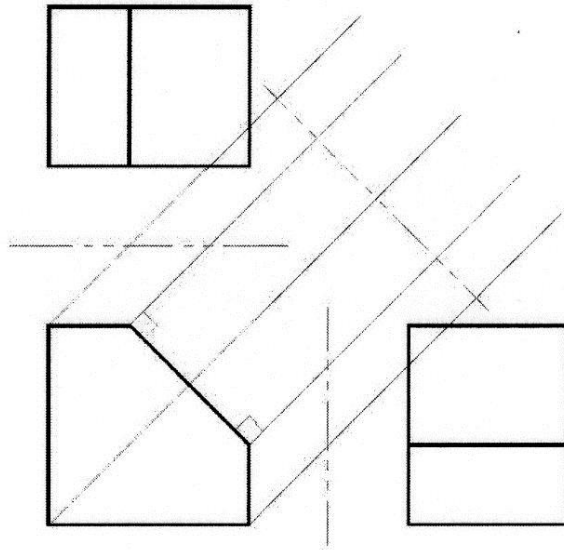


Figure 6. Adding the Folding Line Parallel to the Inclined Surface.

- e. Transfer distances from another view. This view will typically be the view adjoining the view that the auxiliary is drawn from (Figure 7).
- f. Complete the view.

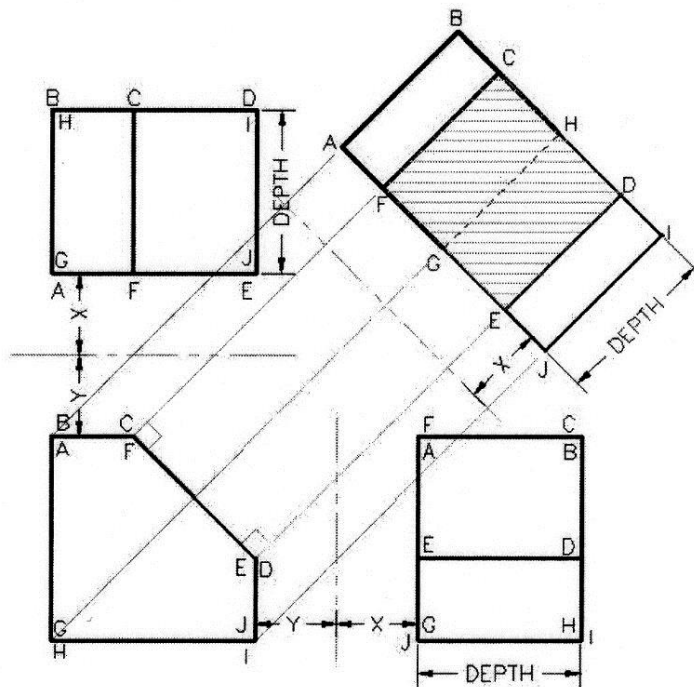


Figure 7. Transferring Distances and Completing the Auxiliary View.