

3D Viewing Techniques

Terms

- Viewpoint—the viewer's position
- Viewplane—the coordinate system of the viewer; the viewer's screen
 - R —the point at which the viewer is looking
 - N —the vector that points from the viewpoint to R ; it is normal to the viewplane
 - d —distance from viewpoint to R
 - U —The y -axis for the viewplane

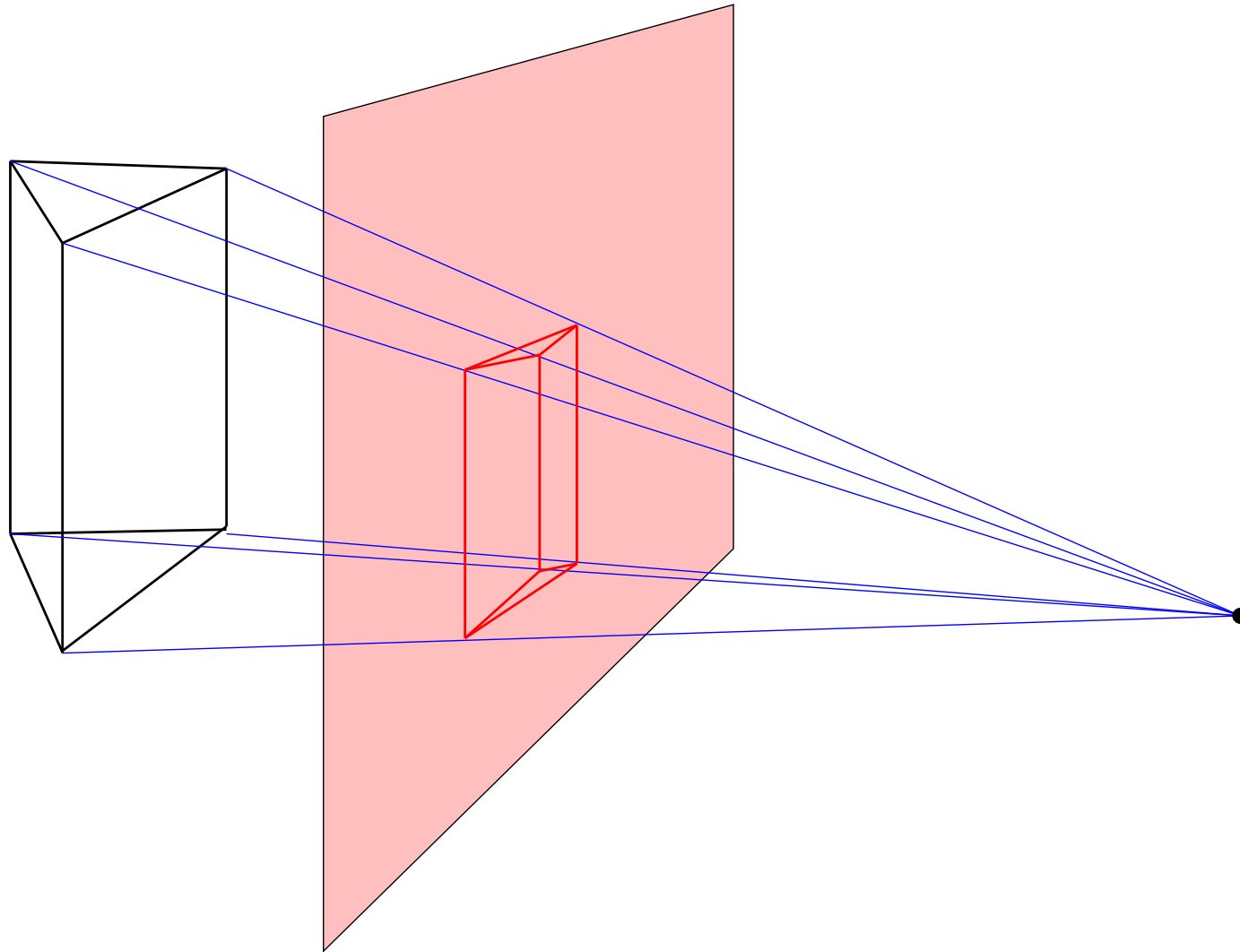
Terms (cont.)

- R —is the *reference point*
- N —is the *viewplane normal*
- d —is the *view distance*
- U —is the *view-up vector*

Viewplane

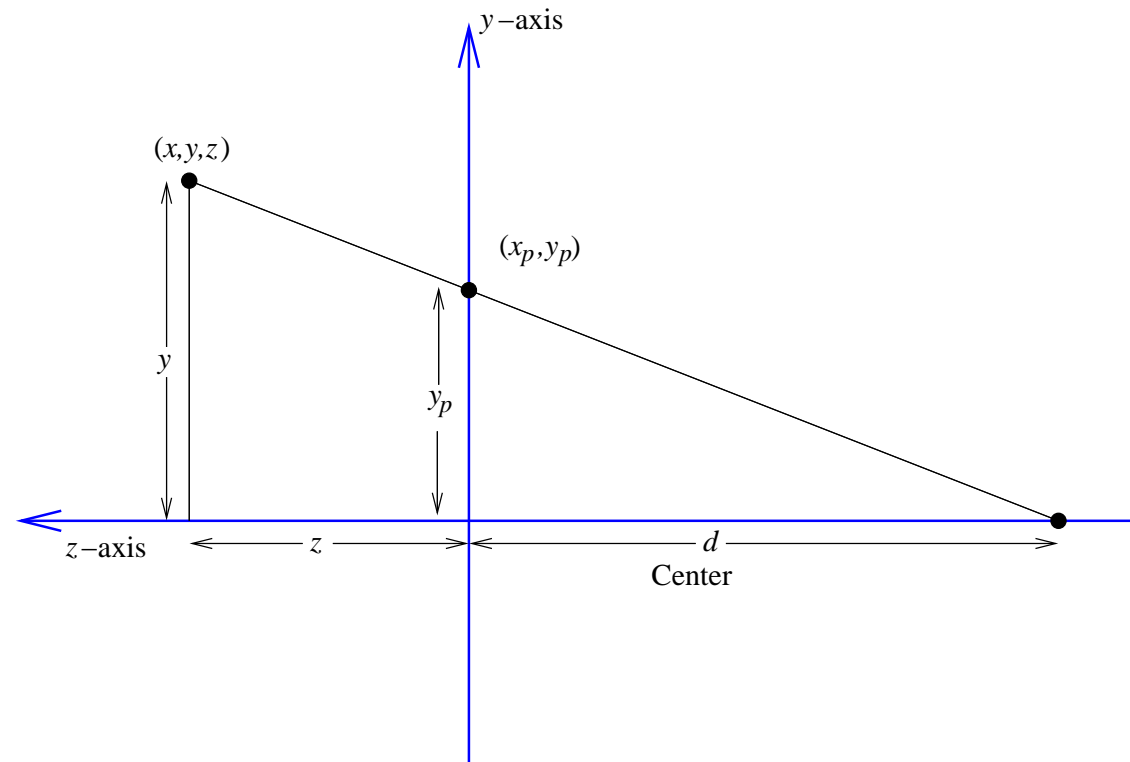
- You can imagine the screen being the viewplane
- Reorienting the viewplane changes the scene's appearance on the screen
- R , N , d , and U unambiguously specify the viewpoint

Perspective Projection



Perspective Projection

1. LHS (left-handed coordinate system)
2. All z coordinates of object are positive
3. d = distance of center of projection to xy -plane ($z = 0$)
4. Center of projection at $(0, 0, -d)$ (center lies on z -axis)



Perspective Projection

$$x_p = \frac{d \cdot x}{d + z}$$
$$y_p = \frac{d \cdot y}{d + z}$$
$$z_p = 0$$

