



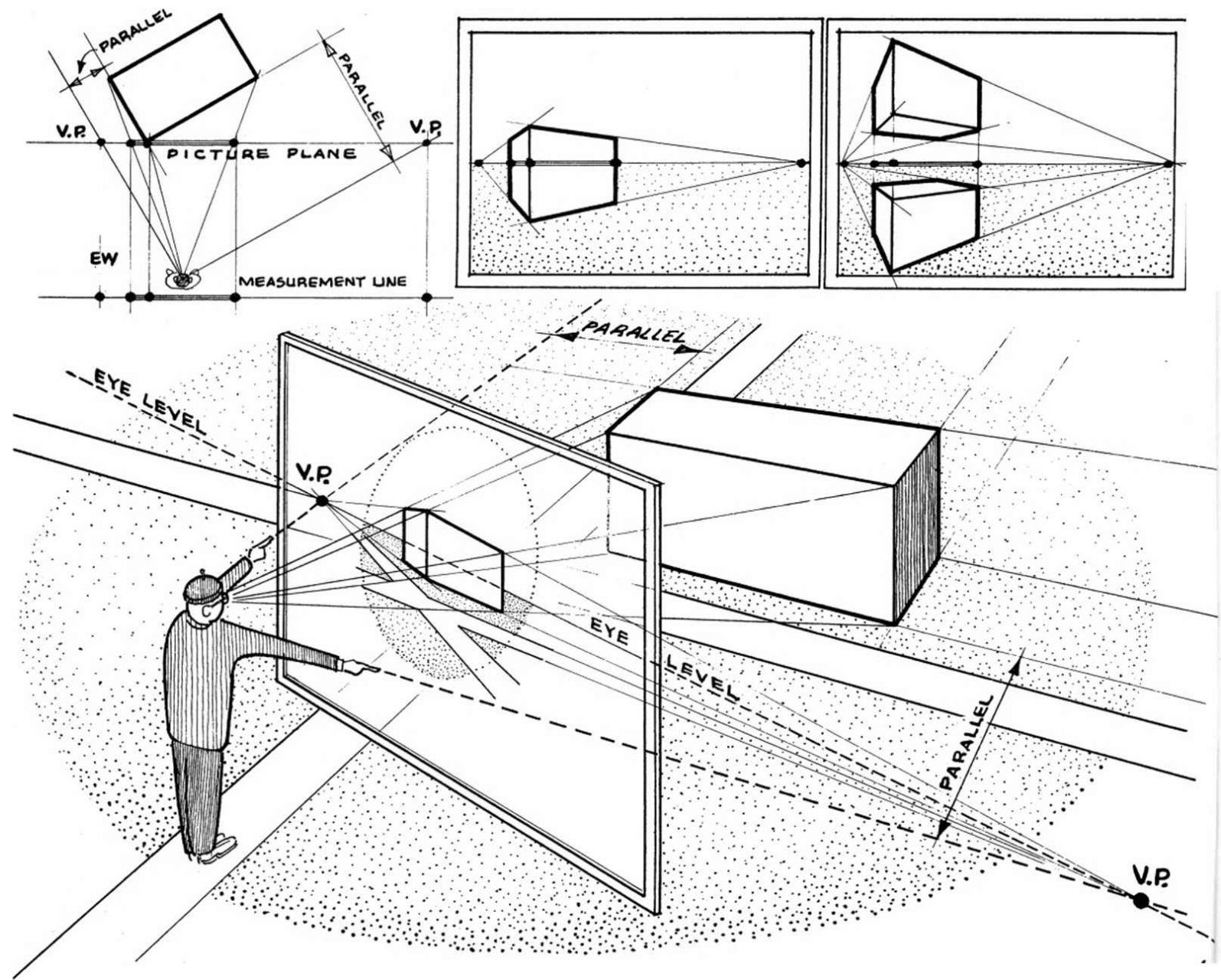
Lens configuration (internal parameter)

$$\begin{bmatrix} \mathbf{x} \\ 1 \end{bmatrix} = \underset{\text{Lens configuration (internal parameter)}}{L} \left(\underset{\text{Spatial relationship between sensor and pinhole (internal parameter)}}{\mathbf{K}} \left[\underset{\text{Camera body configuration (extrinsic parameter)}}{\mathbf{R}} \quad \mathbf{t} \right] \begin{bmatrix} \mathbf{x} \\ 1 \end{bmatrix} \right)$$

Spatial relationship between sensor and pinhole
(internal parameter)

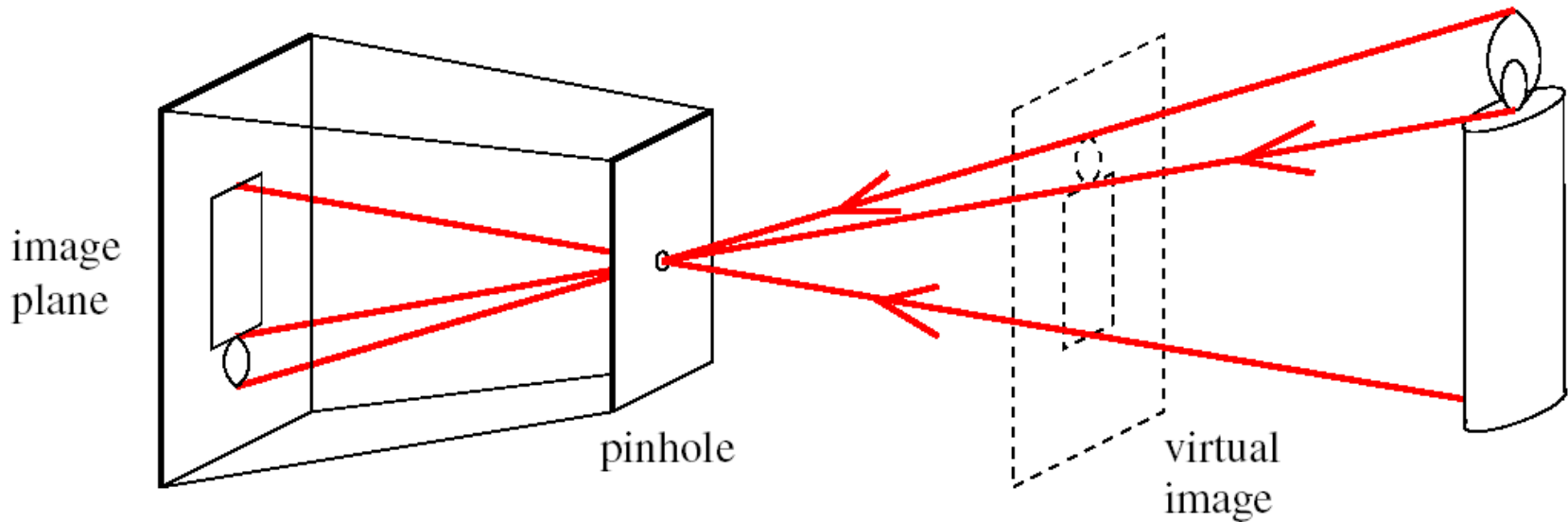
Camera body configuration
(extrinsic parameter)

<http://www.joshuanava.biz/perspective/in-other-words-the-observer-simply-points-in-the-same-direction-as-the-lines-in-order-to-find-their-vanishing-point.html>

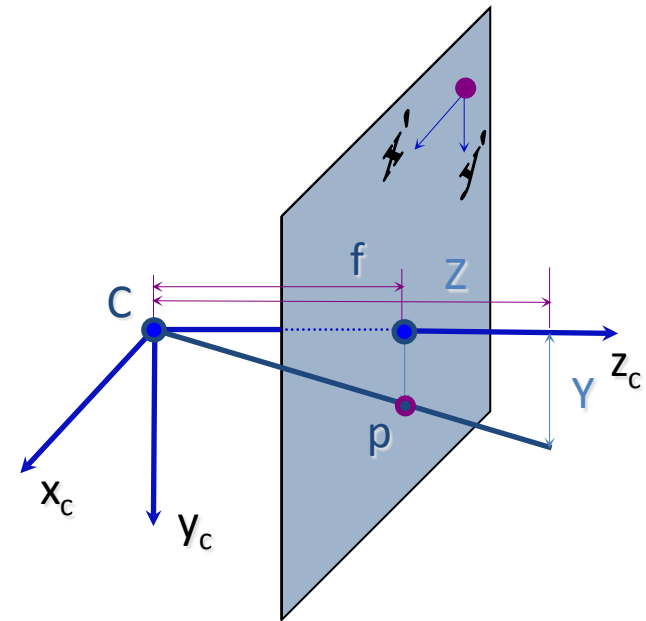


The Pinhole Camera

- Light enters a darkened chamber through a pinhole opening and forms an image on the further surface



1st Person Camera world

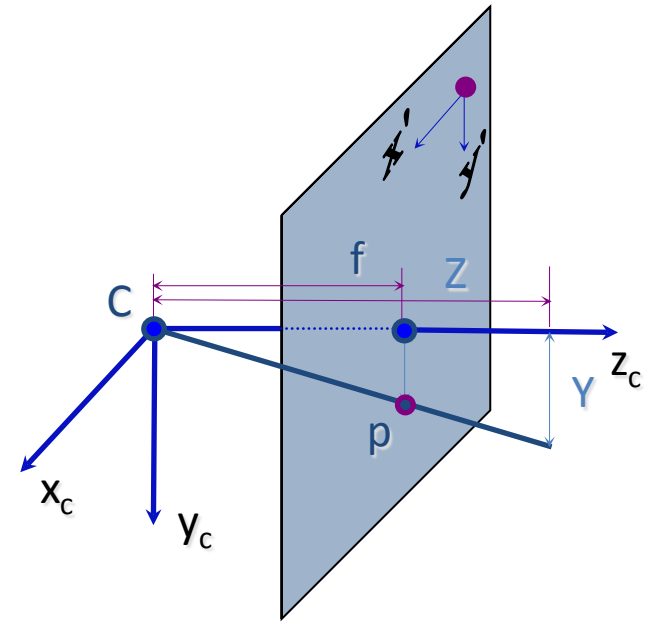


Projection equation:

3D to 2D image:

$$x' = f \frac{X}{Z} \qquad y' = f \frac{Y}{Z}$$

1st Person Camera world



Projection equation:

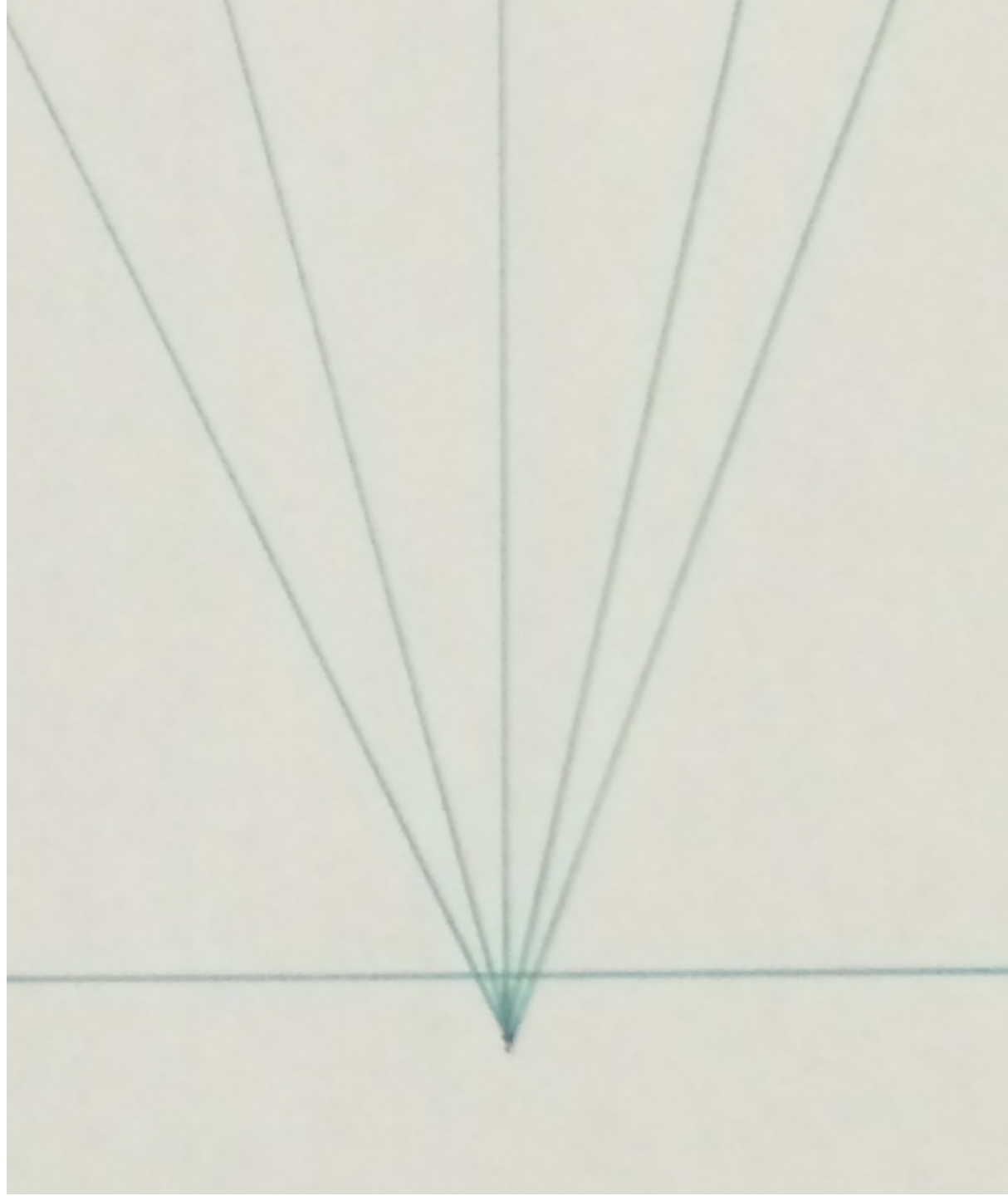
3D to 2D image:

$$x' = f \frac{X}{Z} \quad y' = f \frac{Y}{Z}$$

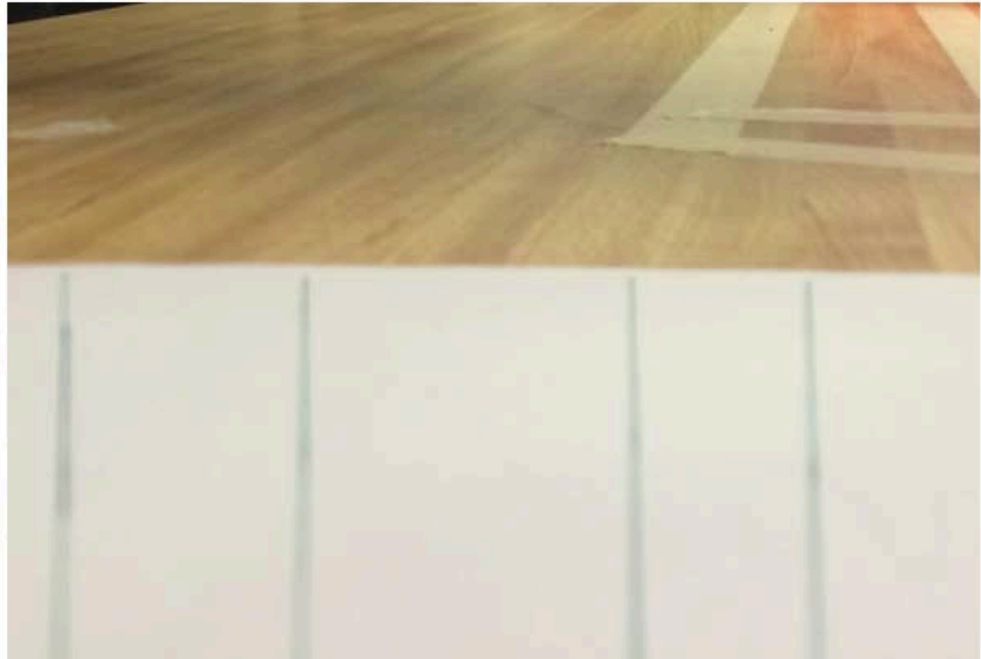
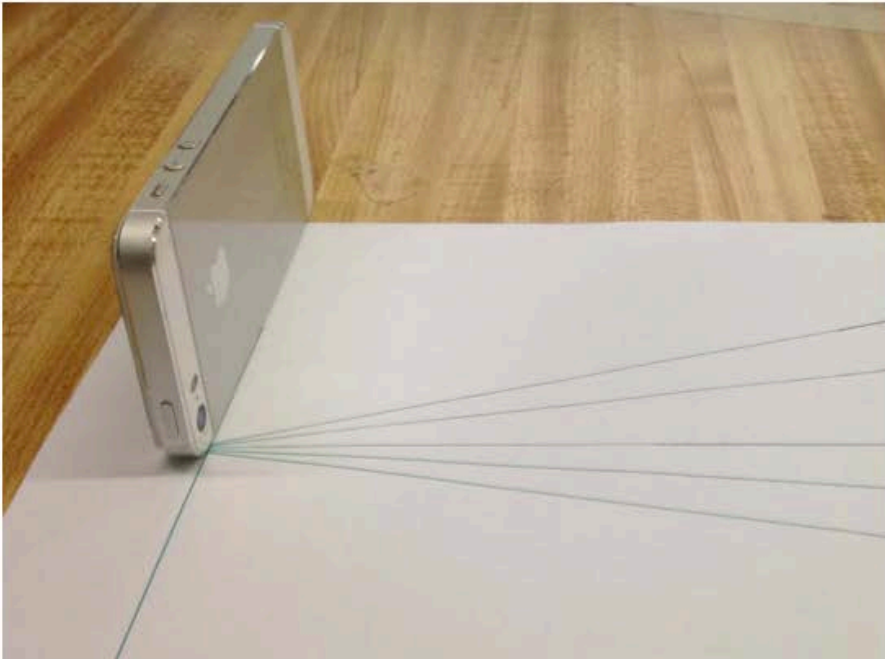
Where is the Center of Projection?
What is the Focal length?

Locating Center of Projection

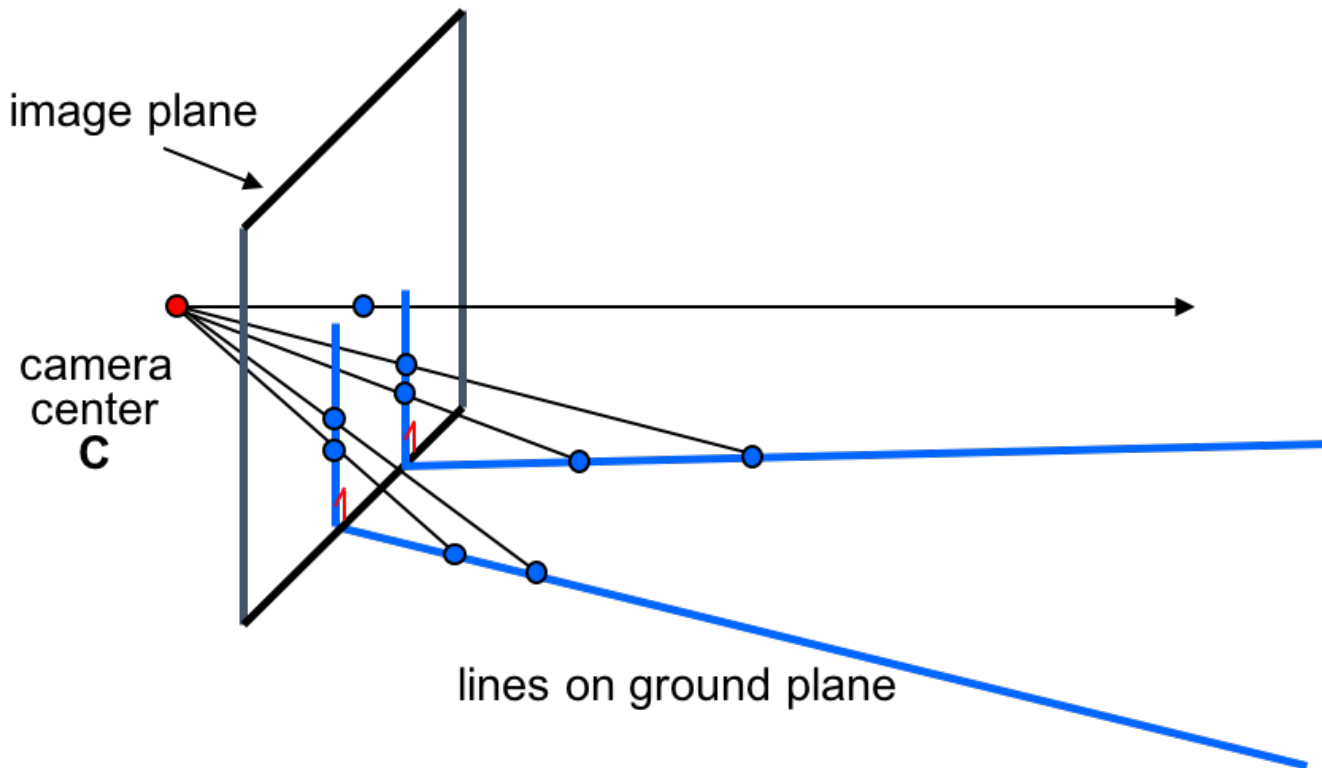




Locating Center of Projection



Locating Center of Projection



Locating Center of Projection

