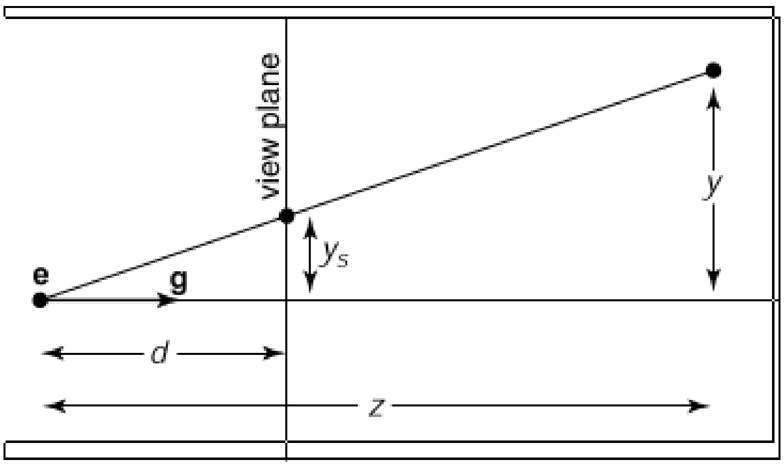
Perspective transformations are how we map points from the view volume to our view plane

We use similar triangles to spacial coordinates to viewplane.

Two simple equations:

1. $y_s = \frac{d}{z} y$
2. $x_s = \frac{d}{z} x$

like so: 

Before continuing, make sure you know the Significance of w

The projection matrix can be expressed as

$$P = \begin{pmatrix} n & & & \\ & n & & \\ & & n+f & -fn \\ & & 1 & \end{pmatrix}$$

where n is the z coordinate of the near plane and f is the z coordinate of the far plane

Multiplying by P yields

$$P \begin{pmatrix} x \\ y \\ z \\ 1 \end{pmatrix} = \begin{pmatrix} x \\ y \\ z\frac{n+f}{n} - f \\ \frac{z}{n} \end{pmatrix} = \begin{pmatrix} \frac{nx}{z} \\ \frac{ny}{z} \\ n + f - \frac{fn}{z} \\ 1 \end{pmatrix}$$

Note that the transformed x ad y components both express the equations at the top of the page. Note also, that for points on the plane $z = f$ and $z = n$, the z coordinate will be unchanged by the transform.