Blender 2

1. P_{xy} After x $+45°$ and Y $+45°$

$$P = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$$

$$R_x = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\frac{\pi}{4} & -\sin\pi/4 \\ 0 & \sin\pi/4 & \cos\pi/4 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 1+0+0 \\ 0+\cos\pi/4+\sin\pi/4 \\ 0+\sin\pi/4+\cos\pi/4 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ \sqrt{2} \end{bmatrix}$$

$$\begin{bmatrix} 1 \\ 0 \\ \sqrt{2} \end{bmatrix} \begin{bmatrix} \cos\pi/4 & 0 & \sin\pi/4 \\ 0 & 1 & 0 \\ -\sin\pi/4 & 0 & \cos\pi/4 \end{bmatrix} = \begin{bmatrix} \cos\pi/4 + 0 + \sin\pi/4 \\ 0 + \sqrt{2} + 0 \\ -\sin\pi/4 + 0 + 0 \end{bmatrix} = \begin{bmatrix} \sqrt{2}+1 \\ 0 \\ -\frac{\sqrt{2}+1}{2} \end{bmatrix}$$

$$P_{xy} = \begin{bmatrix} \sqrt{2}+1 \\ 0 \\ -\frac{\sqrt{2}}{2}+1 \end{bmatrix}$$

2. P_{yx} After Y $+45°$ and x $+45°$

$$P = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$$

R_y

$$P_{yx} = \begin{pmatrix} \sqrt{2} \\ \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} \end{pmatrix}$$

$$\begin{bmatrix} \cos\pi/4 & 0 & \sin\pi/4 \\ 0 & 1 & 0 \\ -\sin\pi/4 & 0 & \cos\pi/4 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} \cos\pi/4 + 0 + \sin\pi/4 \\ 0 + 1 + 0 \\ -\sin\pi/4 + 0 + \cos\pi/4 \end{bmatrix}$$

$$= \begin{bmatrix} \sqrt{2} \\ 1 \\ 0 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\pi/4 & -\sin(\pi/4) \\ 0 & \sin\pi/4 & \cos\pi/4 \end{bmatrix} = \begin{bmatrix} 1+0+0 \\ 0+\cos\pi/4+\sin\pi/4 \\ 0-1+1 \end{bmatrix}$$

3. $t_{1\ cube}^{world} = \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix}$ made translations + rotations and checked cubes location

4. $t_{2\ cube}^{world} = \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix}$

5. images saved

6. The focal length increasing makes the image larger but since the camera is moving away the image remain the same.

7. Image saved with flat lighting