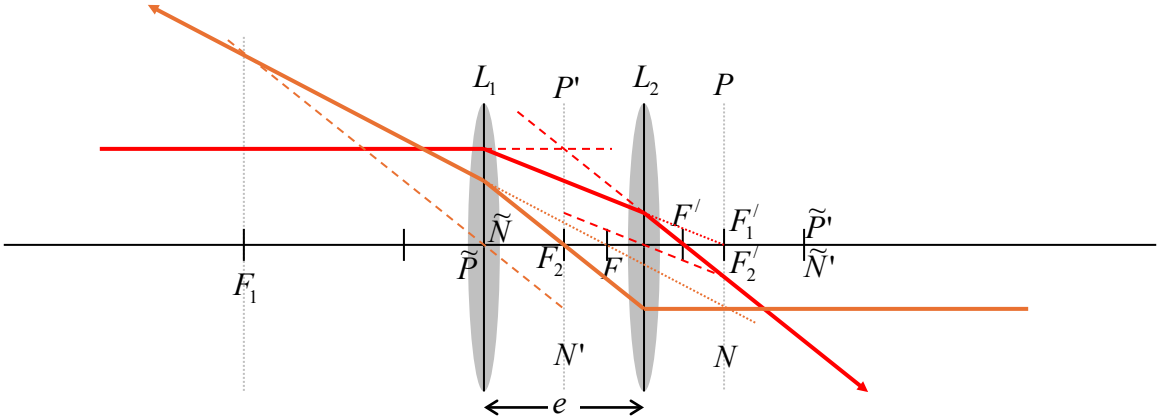
# Huvggens 3-2-1




## Parameter Definition

$$3\text{-}2\text{-}1 \quad \rightarrow \quad \frac{f_1'}{3} = \frac{e}{2} = \frac{f_2'}{1}$$

$$\frac{f_1'}{3} = \frac{e}{2} = \frac{f_2'}{1} = a \quad \rightarrow \quad \begin{aligned} f_1' &= 3a \\ e &= 2a \\ f_2' &= a \end{aligned}$$

Where '$a$' is an arbitrary unit of length.

## Focal Length and Cardinal Points

Focal Lengths: $f' = \frac{3a}{2} \qquad f = -\frac{3a}{2}$

Focal Points:
$$F = \begin{cases} 3a/2 & \text{with respect to apex of Lens 1} \\ -a/2 & \text{with respect to apex of Lens 2} \end{cases}$$

$$F' = \begin{cases} 5a/2 & \text{with respect to apex of Lens 1} \\ a/2 & \text{with respect to apex of Lens 2} \end{cases}$$

Principle Points:
$$P = \begin{cases} 3a & \text{with respect to apex of Lens 1} \\ a & \text{with respect to apex of Lens 2} \end{cases}$$

$$P' = \begin{cases} a & \text{with respect to apex of Lens 1} \\ -a & \text{with respect to apex of Lens 2} \end{cases}$$

Nodal Points: $N = P \qquad N' = P'$