$r = r_1 - r_2$

$Si\ \ m_1 r_1 + m_2 r_2 = 0$

$m_1(r + r_2) + m_2 r_2 = 0$

$m_1 r + m_1 r_2 + m_2 r_2 = 0$

$r_2(m_1 + m_2) = -m_1 r$

$$r_2 = \frac{-m_1}{m_1 + m_2} r$$

$$r_1 = \frac{m_2}{m_1 + m_2} r$$

Masa efectiva :

$$\mu = \frac{m_1 m_2}{m_1 + m_2}$$

$\varphi_1 = \varphi_2\ \ siempre$