

$$f \frac{m_B}{r^2} = r_A \omega^2 = r_A \left(\frac{2\pi}{T} \right)^2 = \frac{m_B}{m_A + m_B} \cdot \frac{4\pi^2}{T^2}$$

$$T = 2\pi \sqrt{\frac{r}{f(m_A + m_B)}}$$

$$\begin{aligned}
 & f \frac{m_B}{r^2} \\
 &= r_A \omega^2 \\
 &= r_A \left(\frac{2\pi}{T} \right)^2 \\
 &= \frac{m_B}{m_A + m_B} \cdot \frac{4\pi^2}{T^2}
 \end{aligned}$$

newline

$$T = 2\pi \sqrt{\frac{r}{f(m_A + m_B)}}$$