Doppler measurements

$$v_{1\,obs} = v_1 \sin(i) \quad , \quad v_{2\,obs} = v_2 \sin(i)$$

$$v_{1\,obs} = \left(\frac{\text{total distance}}{\text{total time}}\right)\sin(i) = \frac{2\pi r_1}{T}\sin(i)$$

$$\frac{v_{1\,obs}}{v_{2\,obs}} = \frac{2\pi r_1 T}{T\, 2\pi r_2}\frac{\sin(i)}{\sin(i)} = \frac{r_1}{r_2} = \frac{M_2}{M_1}$$

K3:

$$\frac{G(M_1+M_2)}{a^3} = \omega^2 = \left(\frac{2\pi}{T}\right)^2$$

$$a = r_1 + r_2 \quad , \quad r_1 = \frac{v_{1\,obs}\, T}{2\pi \sin i}$$

$$\frac{G(M_1+M_2)}{(r_1+r_2)^3} = \frac{G(M_1+M_2)}{\left(\frac{T}{2\pi\sin(i)}\right)^3 (v_{1\,obs}+v_{2\,obs})^3} = \frac{(2\pi)^3}{T^2}$$

$$(M_1+M_2)\sin^3(i) = \frac{(v_{1\,obs}+v_{2\,obs})^3\, T}{2\pi G}$$

unknown — known (measured)