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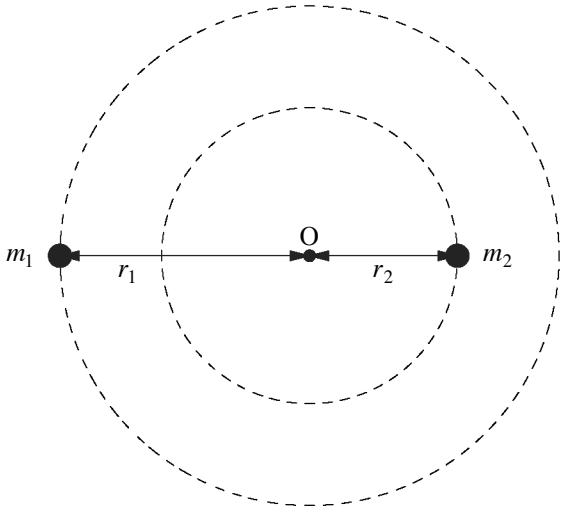

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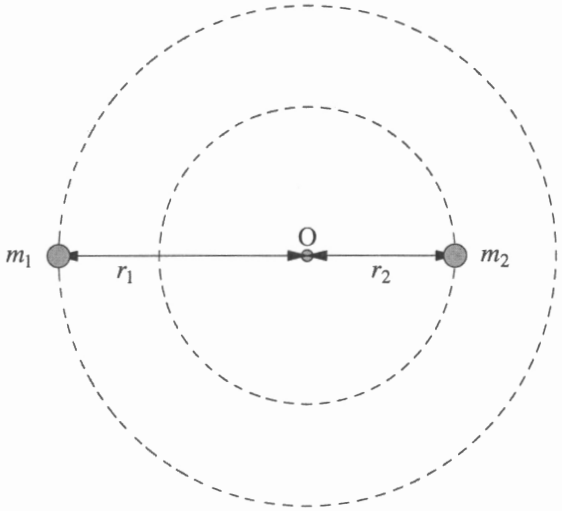

If "O" is the center of mass,

$$m_1 r_1 = m_2 r_2$$

$$r_2 = \frac{m_1}{m_2} r_1 = 3.871 \times 10^9 \text{ m}$$

Consider m_1

$\Sigma F = m_1 a_1$

$$\frac{G m_1 m_2}{(r_1+r_2)^2} = m_1 \frac{v_1^2}{r_1} \Rightarrow$$

$$v_1^2 = \frac{G m_2 r_1}{(r_1+r_2)^2}$$

$$v_1 = \sqrt{\frac{(6.67 \times 10^{-11})(1.86 \times 10^{31})(6.0 \times 10^9)}{[(6.0+3.871) \times 10^9]^2}}$$

$$v_1 = 276{,}000 \text{ m/s}$$