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Gravitational Acceleration and Mass Composition
(A correction to Newton's theory)

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Wrong composition of the acceleration:

$$g = g_2 + g_1 = \frac{Gm_2}{R^2} + \frac{Gm_1}{R^2} \qquad \text{and} \qquad m_2 = n.m_1$$

$$\Leftrightarrow \qquad g = \frac{Gm_1}{R^2}(n+1) = g_1(n+1)$$

Force:

$$F = g_1 m_2 = gm \qquad \Leftrightarrow \qquad m = \frac{g_1 m_2}{g}$$

$$\Leftrightarrow \qquad m = \frac{n.m_1}{n+1} \qquad \text{and} \qquad n = \frac{m_2}{m_1}$$

$$\Leftrightarrow \qquad m = \frac{m_1 m_2}{m_2 - m_1} \qquad \text{or} \qquad \frac{1}{m} = \frac{1}{m_1} + \frac{1}{m_2}$$

This is the wrong reduced mass. It works fine, but is wrong.

True acceleration composition:

$$g = \sqrt{g_1 g_2} = g_1\sqrt{n}$$

True mass composition:

$$m = \sqrt{m_1 m_2} = m_1\sqrt{n} = \frac{m_2}{\sqrt{n}}$$

$$F = mg = m_1 g_2 = m_2 g_1 \qquad \Leftrightarrow \qquad F = G\frac{m_1 m_2}{R^2}$$

For the earth-sun system

$$M_S = 2\times10^{30}\ ; \qquad M_T = 6\times10^{24}\ ; \qquad D_{TS} = 1.5\times10^{11}$$

$$g_T = \frac{GM_T}{D_{TS}^{\ 2}} = 1.78\times10^{-8}\ ; \qquad g_S = \frac{GM_S}{D_{TS}^{\ 2}} = 5.93\times10^{-3}$$

$$F = G\frac{M_T M_S}{D_{TS}^{\ 2}} = 3.56\times10^{22}\,N$$

$$g = \sqrt{g_T g_S} = 1.03\times10^{-5}\ ; \qquad M = \sqrt{M_T M_S} = 3.46\times10^{27}$$

$$F = Mg = 3.56\times10^{22}\,N$$