1/6 $F = W = \dfrac{Gm_1m_2}{r^2}$

where $G = 6.673\,(10^{-11})\ m^3/(kg \cdot s^2)$

$m_1 = 85\ kg$

$m_2 = 5.976\,(10^{24})\ kg$

and $r = (6371 + 250)(10^3)\ m$

Substitute these numbers to obtain $W = 773\ N$

U.S. units: $W = 773\ N\left(\dfrac{1\ lb}{4.4482\ N}\right) = 173.8\ lb$