P #38

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a) $m_s = 100\ kg$

$m_e = 5.98 \times 10^{24}\ kg$

$r = r_e + 2.00 \times 10^6\ m$

$= (6.37 \times 10^6) + (2.00 \times 10^6\ m)$

$r = 8.37 \times 10^6\ m$

a) $PE_G = -\dfrac{G \cdot m_1 \cdot m_2}{r}$

$= -\dfrac{(6.67 \times 10^{-11}\ m^3/kg \cdot s^2)(100\ kg)(5.98 \times 10^{24}\ kg)}{(8.37 \times 10^6\ m)}$

$\boxed{PE_G = -4.77 \times 10^9\ J}$

b) $F_G = -\dfrac{G \cdot m_1 \cdot m_2}{r^2}$

$= -\dfrac{(6.67 \times 10^{-11}\ m^3/kg \cdot s^2)(100\ kg)(5.98 \times 10^{24}\ kg)}{(8.37 \times 10^6\ m)^2}$

$\boxed{F_G = -569\ N}$