Law of Universal Gravitation

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Ex: Calculate the "attraction" between 2 students

To solve: estimate mass and distance

Ex: Find gravitational attraction of a 100 kg man on the surface of the earth

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

$r_e = 6.38 \times 10^{6}\ m$

$m_m = 100\ kg$

$$F = \frac{Gm_1m_2}{r^2} = \frac{Gm_e \cdot m_m}{r^2} = \frac{6.67\times10^{-11} \cdot 5.98 \cdot 10^{24} \cdot 100}{(6.38\times10^{6})^2}$$

$$= 980\ N$$

Find the value of g on Mars

$m_{mars} = 6.42 \times 10^{23}\ kg$

$r_{mars} = 3.37 \times 10^{6}\ m$ 3 p. 223

$g = ?$

$F = mg$ $\quad F = \frac{GMm_2}{r^2}$

$g = Gm_2$ $\quad Gm$

$$g = \frac{Gm_2}{r^2} = \frac{Gm_m}{r_m^2} = \frac{6.67 \times 10^{-11} \cdot 6.42 \times 10^{23}}{(3.37 \times 10^{6})^2} = 3.77\ m/s^2$$