

Ast 25 Week 2a: Homework #02 (5 pts)

Name: _____

- 1) If you (with mass = m) were standing on a planetary object (with mass = M , radius = R), the gravitational acceleration you would experience (called the g 's, g_P) can be calculated by setting Newton's Third Law ($F = ma = mg_P$) equal to the force of gravity ($F_g = GMm/R^2$). Do this, and by showing all intermediate steps, derive the gravitational acceleration you would feel on the planet:

$$g_P = GM/R^2$$

- 2) What is the mass and radius of the Earth? Provide your answers in kg and m. Then, given that $G = 6.67 \times 10^{-11} \text{ N m}^2/\text{kg}^2$, calculate the gravitational acceleration on the surface of the Earth (g_E), in m/s^2 .

M: _____ R: _____ g_E : _____

- 3) If you were on the surface of a tiny asteroid ($m = 5.6 \times 10^{14} \text{ kg}$, $R=4000 \text{ m}$), calculate the gravitational acceleration on the surface (g_A).

g_A : _____

- 4) Calculate the ratio of the gravitational acceleration on the asteroid, compared to the gravitational acceleration on the surface of the Earth (ie., g_A/g_E).

g_A/g_E : _____

- 5) Provide your (approximate) weight in pounds. (I know, how quaint and backwards.) Oh, and if this question is invading your personal data, then just use 160 pounds as your weight. What would your weight be (in pounds) on the surface of the tiny asteroid?

Weight on Earth: _____ Weight on asteroid: _____