Virtual Lecture Notes (Part 2)

It's Just Algebra

Even if you have not taken physics, you have an intuitive understanding of gravity, the force that causes an object to fall when you drop it and keeps us from drifting off into space. For example, picture old film clips of astronauts bounding over the lunar surface, or floating weightlessly during a Shuttle mission space walk, and you realize the impact of the Earth's gravity.

The surface gravity (g) of every planet is different, but can be easily calculated using two basic measurements: the planet's mass (M) and radius (r). If you have taken physics, the following equation will be very familiar and you will recognize that g is more commonly called the acceleration due to gravity. If it is not familiar, simply look at it arithmetically; it <u>only involves</u> multiplication and division.

The following example shows how to calculate the Earth's surface gravity.

$g = \frac{G*M}{r^2}$ $= \frac{(6.67*10^{-11})*(5.98*10^{24})}{(6.378*10^6)^2}$ $= \frac{3.99*10^{14}}{4.07*10^{13}}$ $= 9.81\ m/s^2$	where g is the surface gravity in m/s^2, G is the Universal Gravitational Constant, M is the mass of the planet in <u>kilograms</u>, r is the radius of the planet in <u>meters</u>.

Equations like this are sometimes intimidating because they use unfamiliar jargon, scientific notation, and metric units of measurement. However, it is just algebra! Besides, the computer is going to do the work; you just have to follow the Order of Operations to set it up the calculations.