

Notes on Force of Gravity

1. What word do we usually use when we are referring to the force of gravity of an object?
weight

2. In the US we measure force of gravity in pounds. The SI unit for Force is:
Newtons

3. The equation for force of gravity is:

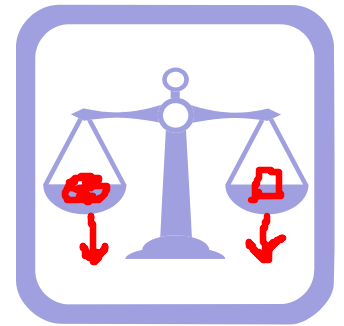
$$F_g = \text{mass} \cdot 9.8$$

The 9.8 is the same 9.8 used in freefall



The 9.8 is what we call the earth's gravitational field strength (near the surface of the earth). The symbol for this is "g".

A balance measures mass



4. If you went to the moon, ~~what~~ would your mass be different than on earth? What about your weight?

No, mass is universal. Weight (force of gravity) would be different. The moon's gravitational field strength is 1/6 of earth.

5. What is the weight of a student with a mass of 50 kg (near the surface of the earth)?

$$\text{Weight} = F_g = m \cdot g$$

$$F_g = 50 \cdot 9.8$$

$$F_g = 490 \cdot N$$

6. My cat Tigger has a weight of 68 N, what is his mass.

$$F_g = m \cdot g$$

$$68 = m \cdot 9.8$$

$$m = \frac{68}{9.8} = 6.94 \text{ Kg}$$

7. An astronaut is on a planet with an unknown acceleration due to gravity. He picks up a rock and drops it from a height of 1.49 m and it takes 1.22 seconds for the rock to hit the ground. He weighs the rock and finds that it is 3.0 Newtons, what is the rock's mass?

$$V_i = 0$$

$$V_f = \text{XX}$$

$$d = -1.49$$

$$a = g = ?$$

$$t = 1.22 \text{ sec}$$

$$d = V_i t + \frac{1}{2} a t^2$$

$$-1.49 = \frac{1}{2} g (1.22)^2$$

$$-1.49 = .744 g$$

$$g = -2.0 \text{ m/s}^2$$

$$F_g = m \cdot g$$

$$3.0 = m \cdot g$$

$$m = \frac{3.0}{g} = \frac{3}{2} = 1.5 \text{ Kg}$$