Circular motion

An object moving at constant speed v in a circle of radius r has an acceleration of magnitude v^2/r, directed toward the center of the circle.

Definitions:

- Period (T) - Time is takes for one revolution.
- Frequency (f) - Number of revolutions per second
- Angular Frequency - Angular Frequency measures how much the angle changes per second.
- RPM - Revolutions per minute, a common way we describe frequency
- The Relationship between Period and Frequency - Period is the inverse of frequency ($T = 1/f$)
- Speed - Magnitude of velocity (just the number)
- Velocity - Distance/time, for circular motion this becomes circumference/period ($2\pi r/T$)
- Centripetal Force (F_C) - Force that points toward the center of the circle, it keeps the object in uniform circular motion. Its formula is $\mathbf{F_C = mv^2/r}$

Gravitation

All massive objects attract each other with a gravitational force.

The **gravitational force** F_G of one object on another is given by $F_G = G\frac{M_1 M_2}{d^2}$:

- M is the mass of an object
- d is the distance between the centers of the two objects
- G is the universal gravitation constant, $6.7 \times 10^{-11}\ \mathrm{N \cdot m^2/kg^2}$

The **gravitational field** g near an object of mass M is given by $g = G\frac{M}{d^2}$, where d represents the distance from the object's center to anywhere you're considering.

The **weight** of an object near a planet is given by mg, where g is the gravitational field due to the planet at the object's location.

The gravitational field near a planet is always equal to the free-fall acceleration.

Gravitational mass is measured by measuring an object's weight using $F_g = weight = mg$

Inertial mass is measured by measuring the net force on an object, measuring the object's acceleration, and using $F_{net} = ma$.

In all experiments ever performed, gravitational mass is equal to inertial mass.