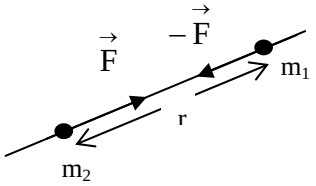
Chapter 14 - Reminder

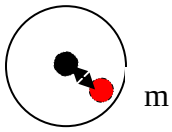


1- Newton's law of **two gravitation particles** formula: $F = G\dfrac{m_1 m_2}{r^2}$

2- **Net force** acting on particle due other particles (**principle of superposition**) is: $\vec{F}_{1,\text{net}} = \sum_{i=2}^{n} \vec{F}_{1i}$

3- A uniform spherical shell of matter attracts a particle that is **outside the shell** as if **all the shell's mass were concentrated at its center**.

4- A uniform spherical of matter exerts **no net gravitational force** on a particle located **inside the shell**.



5- The **gravitational potential energy** of two particles is: $U = -\dfrac{G M m}{r}$

6- First Kepler's Law (**Law of Obits**): All planets move in elliptical orbit, with the sun at one focus.

7- Second Kepler's Law (**Law of Areas**): The rate of sweep area is constant. $\dfrac{dA}{dt} = \text{cons tan t}$

8- Third Kepler's Law (**Law of Periods**): The square of the period of any planet is proportional to the cube of the semimajor axis of its orbit (assumed as circle orbit). $T^2 = \left(\dfrac{4\pi^2}{G M}\right) r^3$

9- The **kinetic energy** of satellites in **circle orbit** is: $K = -\dfrac{U}{2} = +\dfrac{G M m}{2r}$

10- The **mechanical energy** of satellites in **circle orbit** is: $E = -K = -\dfrac{G M m}{2r}$

The **mechanical energy** of satellites in **elliptical orbit** is: $E = -\dfrac{G M m}{2a}$