1 | **Escape Velocity and Gravitational Potential Energy**

1.1 | **Newton's Universal Gravitation Law**

$$\vec{F_g} = -\frac{GM_1 M_2}{r^2}\hat{r} \tag{1}$$

where, $\vec{F_g}$ is the force of gravity on M_2; M_1 and M_2 are two point masses; G the universal gravitation constant; r the magnitude of the vector $\vec{r}$ from M_1 to M_2 and $\hat{r}$ the unit vector in the $\vec{r}$ direction.

Also, introduce the following variables:

- M_e for the mass of the Earth
- g for the acceleration of gravity on the surface of the Earth

1.2 | **Equation for Gravitational Potential Energy**

The general equation for work is as follows:

$$W = \frac{dF}{dx}dx \tag{2}$$

To begin, we need to modify the **_Newton's Universal Gravitation Law_** to fit the parameters of the senario. Namely, we need to treat both Earth and our object as point masses, and assign M_1 to be Earth and M_2 to be our object.

Also, it is necessary to define the coordinate system: th