- Write a formula for the electrostatic potential due to a point charge.

Solution

$$\Phi = \frac{1}{4\pi\epsilon_0}\frac{Q}{r}$$

where ϵ_0 is a constant called the permittivity of free space or vacuum permittivity. Like Newton's constant, you should learn how to look up the value of ϵ_0 on the internet. It is a constant with dimensions, so its value depends on the system of units you are using. It almost always appears in formulas in the form $\frac{1}{4\pi\epsilon_0}$.

- Write the formula for the gravitational potential due to a point mass.

Solution

$$\Phi = -G\frac{M}{r}$$

where G is Newton's gravitational constant. You should learn how to look up the value of G on the internet. It is a constant with dimensions, so its value depends on the system of units you are using.

- Sketch a graph of the function $\frac{1}{r}$

Solution In this context r is the distance between two points, so it is always positive. The function $\frac{1}{r}$ becomes infinitely large when r is zero and approaches zero asymptotically when r is large. The graph is below.