Fields Comparison

To be able to state the similarities between gravitational and electric fields
To be able to state the differences between gravitational and electric fields

Comparing Fields

We can see that the characteristics of gravitational and electric fields have some similarities and differences.

	Gravitational Fields	***Electric Fields***
Force is between	Masses	Charges
Constant of proportionality	G	$\frac{1}{4\pi\varepsilon_0}$
Equation for force	$F = -\frac{Gm_1m_2}{r^2}$ Newton (N) Vector	$F = \frac{1}{4\pi\varepsilon_0}\frac{Q_1Q_2}{r^2}$ Newtons (N) Vector
Nature of force	Attractive only	Like charges repel Different charges attract
Definition of field strength	Force per unit mass	Force per unit charge
Field strength in radial field	$g = -\frac{GM}{r^2}$ Newtons per kilogram (N/kg) Vector	$E = \frac{Q}{4\pi\varepsilon_0 r^2}$ Newtons per Coulomb (N/C) Vector
Definition of potential	The work done in bringing a unit mass from infinity to the point in the field	The work done in bringing a unit charge from infinity to the point in the field
Potential	$V = -\frac{GM}{r}$ Joules per kilogram (J/kg) Scalar	$V = \frac{Q}{4\pi\varepsilon_0 r}$ Joules per Coulomb (J/C) Scalar
Potential at infinity	0	0
Work done moving between points of different potential	$\Delta W = m\Delta V$ Joules (J) Scalar	$\Delta W = Q\Delta V$ Joules (J) Scalar
Gradient of potential against distance graph	Field strength	Field strength