Forces and inverse-square law behaviour

The intensity of radiation from a point light source decreases with distance, following an 'inverse square' relationship. This means that at 2x distance, intensity falls to $1/2^2$ = ¼ intensity. At 3x distance, intensity falls to $1/3^2$= 1/9 intensity.

Inverse-square law graph

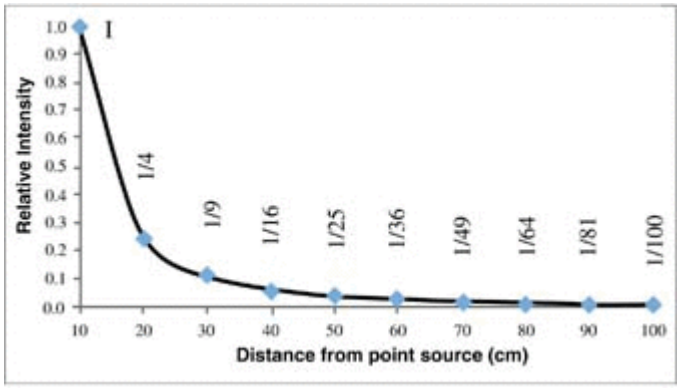
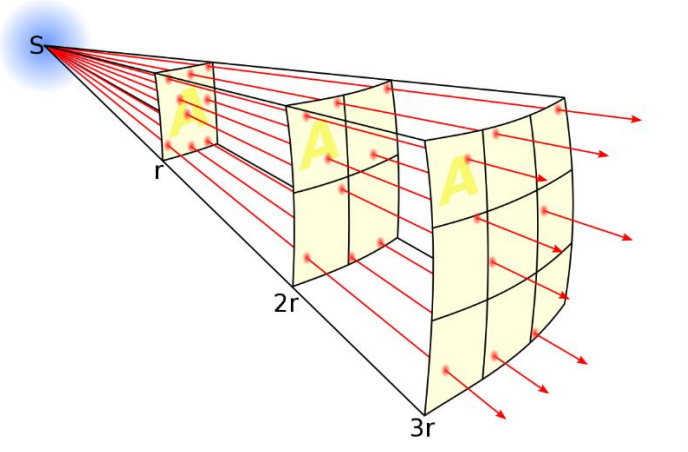


Figure 1 – Graphical representation of inverse square law behaviour

Both gravitational fields and electric fields follow the inverse square law. The field strength drops off in an inverse square relationship with distance from source.



The equations for graviational force and elecrostatic force show that both follow a $1/r^2$ relationship. This tells us they will both have inverse square law behaviour.

Gravitational Force	Electrostatic Force
$F = -\frac{Gm_1m_2}{r^2}$ Newton (N)	$F = \frac{1}{4\pi\varepsilon_0}\frac{Q_1Q_2}{r^2}$ Newtons (N)

The gravitational force on a mass close to the Earth falls of with distance from the centre of the Earth, as shown

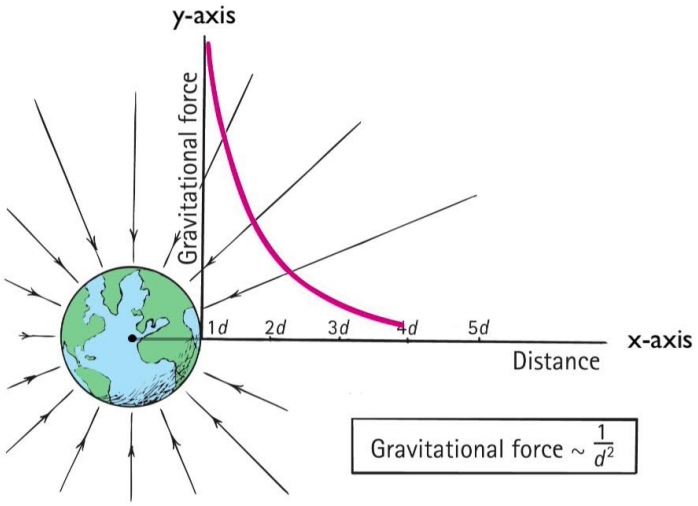


Figure 3 – How gravitational force falls with distance from centre of Earth.