

Basic Assumptions:

- (1) Space and Time form a 4D manifold
- (2) Gravity is not a force, but the curvature of spacetime.

Energy Momentum Tensor $T_{\mu\nu}$

Describes the distribution of mass and energy in spacetime.



Einstein's Equation

$$R_{\mu\nu} - \frac{1}{2}R g_{\mu\nu} = 8\pi G T_{\mu\nu}$$



Metric Tensor $g_{\mu\nu}$

Describes the curvature of spacetime.



Connection Symbol $\Gamma^\gamma_{\alpha\beta}$

Adjusts for the change in basis vectors.



Covariant Derivative

$$\frac{dv^\alpha}{d\lambda} + \Gamma^\alpha_{\gamma\beta} \frac{dx^\beta}{d\lambda} v^\gamma$$

Replaces the regular derivative in curved space.



Geodesic Equation

$$\frac{d^2 x^\mu}{d\lambda^2} + \Gamma^\mu_{\rho\sigma} \frac{dx^\rho}{d\lambda} \frac{dx^\sigma}{d\lambda} = 0$$

Defines an inertial path through spacetime.