Force and Motion: In-Depth Analysis

1. Frictional Force (F_f)

Opposes motion between surfaces in contact.
- Static Friction: No motion until threshold.
- Kinetic Friction: Motion friction.
Formula: $F_f = \mu * N$

2. Normal Force (N)

The perpendicular support force from a surface.
Balances the weight component perpendicular to surface.

3. Tension Force (T)

Pull transmitted through flexible connectors.
Acts along the connector, equal at both ends.

4. Applied Force (F_app)

External force applied by a person or object.
Causes net acceleration proportional to magnitude.

5. Air Resistance (Drag, F_d)

Frictional force from air.
Formula: $F_d = 1/2 * C_d * \rho * A * v^2$
Image: https://i.imgur.com/3tC1Q0R.png

6. Spring Force (Elastic, F_s)

Restoring force in springs.
Hooke's Law: $F_s = -k * x$
Image: https://i.imgur.com/N5uCbDu.png

7. Gravitational Force (F_g)

Attractive force between masses.
Formula: $F_g = G * (m1 * m2) / r^2$
Image: https://i.imgur.com/W7vQ9YX.png

8. Electrostatic Force (F_e)

Force between charges.
Coulomb's Law: $F_e = k_e * |q1 * q2| / r^2$
Image: https://i.imgur.com/7vYhK2Y.png

9. Magnetic Force (F_B)

Force on moving charge in magnetic field.
Vector: $F_B = q * (v \times B)$
Image: https://i.imgur.com/bqj5F1o.png