

MITOCW | MIT8_01F16_Intro_09_360p

This week, we will use the concepts of momentum and energy to examine an application of great importance-- collisions.

A collision is an event where two or more objects exert forces on each other over a short time interval, and where the interaction forces dominate over any external forces.

Common examples are collisions involving projectiles, collisions of motor vehicles, collisions in sports, and collisions between atomic or subatomic particles.

It is worth noting that the colliding objects need not actually touch each other in the collision, as long as the interaction force does not require a contact.

For example, two positively charged protons shot towards each other will repel each other due to the Coulomb electric force.

Their interaction can be treated as a collision even if they never actually touch.

We will see that momentum is always conserved in a collision as long as external forces can be entirely neglected.

However, energy is not necessarily conserved.

This leads to the distinction between elastic collisions, where energy is conserved, and inelastic collisions, where energy is not conserved.

We will also derive a simple, but powerful principle in the case of elastic collisions in one dimension, that the relative velocity of one particle with respect to the other is simply reversed by the collision.