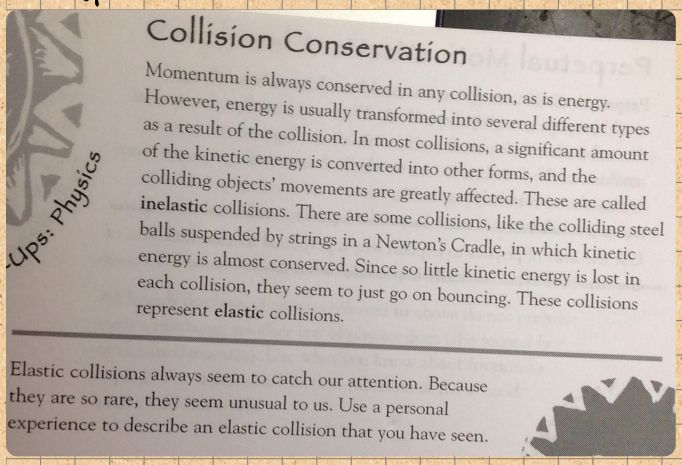
Warm-up:



Cups: Physics

Collision Conservation

Momentum is always conserved in any collision, as is energy. However, energy is usually transformed into several different types as a result of the collision. In most collisions, a significant amount of the kinetic energy is converted into other forms, and the colliding objects' movements are greatly affected. These are called **inelastic** collisions. There are some collisions, like the colliding steel balls suspended by strings in a Newton's Cradle, in which kinetic energy is almost conserved. Since so little kinetic energy is lost in each collision, they seem to just go on bouncing. These collisions represent **elastic** collisions.

Elastic collisions always seem to catch our attention. Because they are so rare, they seem unusual to us. Use a personal experience to describe an elastic collision that you have seen.

- Kinetic Energy: motion !!
  - ↳ $KE = \frac{1}{2}mv^2$
- Potential Energy: stored !!
  - ↳ Gravitational Potential Energy:
    - ↳ $GPE = mgh$
  - ↳ Elastic Potential Energy: returns to shape
    - ↳ $EPE = \frac{1}{2}Kx^2$ x = stretch length; K = spring constant depends on elastic material

Question: which item would have a greater elasticity constant, a car suspension spring or a rubber band?

Practice Problems: $KE = \frac{1}{2}mv^2$ $GPE = mgh$ $EPE = \frac{1}{2}Kx^2$

1) How much energy does a 1,250 kg car have when moving at 60.0 mph?
Conversions: 1 mile = 5,280 Ft 3.28 ft = 1 m

2) What is the GPE of a 120 lb diver at a 10 ft diving board?
Conversions: 2.2 lb = 1 kg 3.28 ft = 1 m

3) How much energy is stored in a spring with K = 225 N/m and is stretched to 20.0 cm?
Conversions: 100 cm = 1 m

4) What is the spring constant of a trampoline stretched 0.855 m by a 200 lb person?
Conversions: 2.2 lb = 1.0 kg