Interactions

Enduring Understanding - Momentum and energy are conserved when objects interact.

Work and Energy

Application of Newton's Third Law
Equal and opposite forces acting through the same displacement.

Impulse and Momentum

Application of Newton's Third Law
Equal and opposite forces acting over the same time interval. (Next Unit)

BOLD lined boxes mean Pre-AP ONLY

Essential Question
How does expending energy equate to doing work?

- Work
  - When is work done?
    - Force Parallel to Δd → Work $W = F\Delta d$
    - Force Perpendicular to Δd → Work = 0
    - Force at an angle to Δd → Work $W = F\Delta d\cos\theta$
- Power → $P = \frac{W}{t} = \frac{E}{t} = Fv$

Essential Question
How much potential energy does an object resting on a table posses?

- Potential Energy
  - Gravitational $PE_{gravity} = mgh$

Essential Question
How does an object gain or loss energy?

- Work-Kinetic Energy Theorem
  - $W_{net} = \Delta KE$ → Kinetic Energy $KE = \frac{1}{2}mv^2$
  - Net Work
    - Net Work = Positive Gain Energy
    - Net Work = Negative Loss Energy
    - → Colonel Stapp Problem

Essential Question
What does it mean to transfer energy; to exchange energy?

- Conservation of Energy
  - Conservation of Mechanical Energy
    - Conservation of Kinetic and Potential Energies $PE_i + KE_i = PE_f + KE_f$
      - Captain Kittenger Problem
        - → Roller Coaster Lab
  - Conservation of ALL Energies
    - Work-Energy Theorem $W = \Delta E$
      - Heat
      - Heat $Q = mc\Delta T$

GravityKills