Unit 03A: Energy (Mechanics) NJ NGSS

Content Area: **Science**
Course(s): **Generic Course**
Time Period: **Marking Period 2**
Length: **3**
Status: **Published**

Standards

- Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. (HS-PS3-1),(HS-PS3-2)
- At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy. (HS-PS3-2) (HS-PS3-3)
- Conservation of energy means that the total change of energy in any system is always equal to the total energy transferred into or out of the system. (HS-PS3-1)
- Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. (HS-PS3-1),(HS-PS3-4)
- When two objects interacting through a field change relative position, the energy stored in the field is changed. (HS-PS3-5)
- Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. (HS-PS3-3)

http://www.state.nj.us/education/modelcurriculum/sci/physicsu3.shtml

SCI.9-12.HS-PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative position of particles (objects).
SCI.9-12.HS-PS3-5	Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.
SCI.9-12.HS-PS3-3	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
SCI.9-12.HS-PS3-1	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

Essential Questions

- How does a rollercoaster progress around a track without an engine or power?
- How can you build the most effective crossbow?
- What important energy transformations happen in every day life?
- How do machines make life easier?
- How can one explain and predict interactions between objects and within systems of objects?

Content / Skills

- Define and apply the concept of work. (Accelerated & CP)
- Define and apply the concept of kinetic theory. (Accelerated & CP)
- Define and apply the work-kinetic energy theory. (Accelerated)
- Define and apply the concept of gravitational potential energy. (Accelerated & CP)
- Define and apply conservation of mechanical energy. (Accelerated & CP)
- Define and apply the concept of power. (Accelerated & CP)
- Apply and solve problems using the law of conservation of energy. (Accelerated)
- Define, apply, and solve problems regarding power. (Accelerated & CP)
- Define and apply the concept of torque. (Accelerated)
- Define and apply the concept of a simple machine. (Accelerated & CP)
- Identify the 6 simple machines. (Accelerated & CP)
- Solve static equilibrium problems. (Accelerated)
- Evauate the mechanical advantage and efficiency of a simple machine. (Accelerated & CP)