December 6, 2017

6th Kinetic Energy Review

***Vocab***

* **Law of Conservation of Energy:** a principle that states that energy is neither created nor destroyed, it simply changes form
* **Kinetic energy:** the energy of motion
* **Thermal kinetic energy**: the movement of molecules
  + The energy of heat
  + When molecules move faster, they have greater kinetic energy and more heat
* **Electrical kinetic energy**: the movement of electrons
* **Light kinetic energy**:the movement of photons
* **Potential energy:** the energy stored in an object or substance.
* **Gravitational potential energy:** the potential energy that exists between two objects that exert a gravitational pull on each other
  + Associated with falling objects
* **Electrical potential energy:** the potential energy that exists when comparing a region of high electrical charge to one of low electrical charge
* **Chemical potential energy:** the potential energy stored in the chemical bonds of chemical compounds
  + All of the Earth’s energy comes from the sun
  + Plants convert sun’s energy into stored chemical energy, which is passed down the food chain
  + Fossil fuels contain stored chemical energy
* **Watt:** measure of electrical energy, unit of power
* **Lux**: measure of light or illumination
* **Combustion reaction**: fuel + O2 🡪 H2O + CO2
  + Very common way of converting stored chemical energy into kinetic energy
  + Exothermic reaction, which means it gives off heat
  + Forest fire – combustion reaction converting stored chemical energy into the kinetic energy of heat, light, and sound

***Focus Questions***

*How does the transfer of potential energy to kinetic energy relate to the Law of Conservation of Energy?*

* All of the energy changes observed in our investigations were due to the transfer of energy from potential to kinetic or from kinetic to kinetic and not because energy disappeared or was created.
* For example, in Investigation #1, we dropped the wood ball and knocked it into the plastic bear. The ball had potential energy when it was held in the air, and it increased in kinetic energy as it fell. The ball also transferred kinetic energy to the bear when it hit the bear and caused it to move. In these instances, energy was converted from potential into kinetic, but not created or destroyed.
* In Investigation #3, we observed the conversion of chemical potential energy to kinetic energy. Vinegar and baking soda are composed of lots of atoms that are held together by chemical bonds. These bonds store chemical potential energy. When we mixed the vinegar with baking soda, the chemical bonds were broken and reformed, converting the chemical potential energy into kinetic energy. We were able to see this conversion into kinetic energy due to the gas bubbles being formed and the inflation of the balloon.

*Can one form of energy be converted to another? Support your answer with data from the experiments.*

* In Investigation #1, we converted potential energy into kinetic by dropping the pendulum ball. As it swung down, the potential energy in the ball was converted into kinetic energy.
* In Investigation #2, we observed the conversion of electrical energy to light energy and the conversion of light energy to thermal energy. As electricity flowed into the lightbulb, the moving electrons caused the tungsten in the lightbulb to glow, converting electrical energy into light energy. This light energy caused the molecules in the air around the bulb to move very fast, causing heat and thus converting light energy into heat energy.
* In Investigation #3, we observed the conversion of chemical potential energy to kinetic energy. Vinegar and baking soda are composed of lots of atoms that are held together by chemical bonds. These bonds store chemical potential energy. When we mixed the vinegar with baking soda, the chemical bonds were broken and reformed, converting the chemical potential energy into kinetic energy. We were able to see this conversion into kinetic energy due to the gas bubbles being formed and the inflation of the balloon.

*How does converting energy from one form to another relate to the conservation of energy?*

* The Law of Conservation of Energy states that energy cannot be created or destroyed but can be converted from one form to another.
* Investigation #2 showed direct relationships for the conversion of electrical energy to light energy and light energy to heat.
* In Investigation #3, we observed a direct relationship between the amount of vinegar (chemical potential energy) and the circumference of the balloon.

*What kind of energy is lightning and what is it converted into?*

* Lightning is a form of electrical energy and it is converted into light, heat, and sound energy

*What is the charge of electrons and in which direction do they move in a circuit?*

* Electrons are negative, and they move from negative to positive.

*How does a lightbulb work?*

* When you turn the light switch on, electricity begins to flow through the tungsten filament in the lightbulb
  + Electricity flows through closed circuits
* A brighter light means that more electricity (and therefore more electrons) is flowing through the bulb
* A dimmer light means that less electricity and fewer electrons are flowing through the bulb
* There is no oxygen in a lightbulb because it would cause the tungsten to combust
  + Instead, the inert gas argon is used in lightbulbs

*In what ways can we produce electricity?*

* Solar power, wind power
* Fossil fuels (natural gas and coal)
* Hydroelectric (water, ex. dams, water wheels)
* Nuclear

Humans conduct electricity

Hydrocarbons are made of hydrogen and carbon