Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_\_\_ Ast: \_\_\_\_\_

**Physical Science Honors: Conservation of Energy Study Guide**

**On a separate sheet of paper, respond to the following (*the more detail the better!*):**

1. Define Energy.

***The ability to do work or to cause change.***

1. What is the metric unit of measure for Energy?

***Joules (J)***

1. What is Thermal Energy? Give an example.

***The total energy of the particles in an object. The thermal energy of a pot on a stove is the energy of all of its particles added together.***

1. What is Chemical Energy? How is chemical energy released? Give an example.

***Chemical energy is energy stored in chemical bonds. It is released when those bonds are broken. When you eat food, your body breaks the bonds that the food is made of and releases the energy in the food to be used for bodily functions.***

1. What is Electrical Energy? Give an example.

***Energy carried by moving electrons. Power lines, batteries, lightning.***

1. How is sound similar to light?

***Both travel on waves***

1. How does sound work? Why would you not hear sound in space?

***Particles bump into one another in a wave pattern which carries the sound. In space, there is a vacuum, which means there are no particles to bump into one another.***

1. What is Radiant Energy? Give an example.

***Energy that travels on electromagnetic waves…light is a form of radiant energy***

1. What is Nuclear Energy?

***Energy stored in the nucleus of atoms and released during nuclear reactions***

1. Explain the difference between fission and fusion. Which is done by a power plant and which is done by the Sun?

***Fission is when the nucleus of an atom is blasted apart and releases great amounts of energy. This is what happens in a nuclear power plant or an atomic weapon. Fusion is when two nuclei are joined together, which releases even greater amounts of energy. This is what fuels the Sun (or any star).***

1. What is currently preventing the use of nuclear fusion to meet the energy needs of our society?

***The process uses far more energy than it produces with our current technology.***

1. What is Mechanical Energy? List the two types of Mechanical Energy.

***Energy that objects have due to their motion or position. Kinetic energy is the energy of motion. Potential energy is stored energy.***

1. What does Kinetic Energy depend on?

***Kinetic energy depends on the mass of an object and its speed.***

1. How are the two types of Potential Energy similar? How are they different?

***Both types deal with stored energy because of the position of an object. They are different in the ways that the object stores the energy.***

1. What does Gravitational Potential Energy Depend on?

***GPE depends on the mass and the height of an object. Objects gain GPE when their height increases.***

1. Define the law of conservation of energy.

***Energy cannot be created or destroyed; only transferred from one object to another or converted from one form to another.***

1. Explain the law of conservation of energy.

***The total amount of energy in a system will remain constant (will not change). Energy is not lost, it may just be in a different object or in a different form.***

1. Draw a Venn diagram to compare three types of systems (open, closed, and isolated) in terms of energy and matter. (Carefully think about how you can set this up!)

***Open System – Both energy and matter are free to enter and exit the system (ex: a pot of boiling water on a stove without a lid)***

***Closed System – Matter is contained within the system, but energy is free to enter or leave the system (ex: a pot of boiling water on a stove with the lid on)***

***Isolated System – Both energy and matter are contained within the system; neither can enter or leave (ex: a 100% efficient thermos with hot water inside)***

1. Explain the transfer of energy as a ball bounces when it is dropped, why it doesn’t bounce all the way back to the drop height, and how that relates to the law of conservation of energy.

***When the ball is dropped, it begins with a certain amount of GPE. As it drops, the GPE is converted into KE. The ball experiences friction with air particles and some of the energy is converted into Thermal energy. When the ball hits the ground, some of the energy is converted into Sound and the ball compresses, converting some energy to Elastic PE (and thermal due to friction within the ball). When the EPE is released, the energy is converted into KE (again converting some to Thermal due to friction with air particles). As the ball gets higher, its KE is converted into GPE. At the top of the bounce, the ball only has GPE, but it will have less GPE than it began with (bounce height is lower than drop height). However, this energy is not lost, it is the energy that was converted into thermal energy and sound throughout the bounce.***

1. Explain the transfer of energy as a ball on a string swings back and forth, why it eventually stops swinging, and how that relates to the Law of Conservation of Energy.

***When you pull the ball back, you give it height, which means you are putting GPE into the ball. When you release the ball, the GPE is converted into KE as the ball swings down. On the up-swing, the KE is converted back into GPE. This continues back and forth as the ball swings. As the ball is moving through the air, it experiences friction, which converts some of the energy into thermal energy. Eventually, the ball will stop swinging because it will have converted all of its energy into thermal energy. The energy was not lost, it was just converted and transferred into the air particles.***

1. Explain the concept of Hydroelectricity using the picture of a dam below. Discuss energy conversions.

***Water at the top of the reservoir has GPE. When the sluice gates open, the water falls down the sluice, converting the GPE into KE. At the bottom of the sluice, the KE in the water is converted into KE in the turbine as the water makes the turbine spin. The spinning turbine powers the generator which converts the KE into Electrical energy. The electrical energy is sent through power lines into your home where you can flip a switch and turn it into radiant, kinetic, thermal, etc…***