

## Energy and Momentum Vocabulary

1. **Energy**: The ability to do work (move things) or to cause change. Energy is measured in Joules.
2. **Work**: A force applied over a distance. You know that work has been done if an object moves.  
Formula for work:  $\text{Work} = \text{Force} \times \text{distance}$ . Work is measured in Joules.
3. **Joules**: units for work and energy. One Joule is equal to one Newton meter.
4. **Force**: A push or pull. You know that a force is present if an object has a change in shape or motion. Force is measured in Newtons.
5. **Mass**: The amount of matter in an object; measured in grams.
6. **Matter**: All objects and substances are made up of matter. Any thing that has mass and takes up space.
7. **Potential Energy**: Stored energy or energy of position. The higher an object is off the ground, the greater its energy of position is. The more mass an object has, the greater its potential energy is.  
**Formula for calculating gravitational potential energy:**  
 $\text{GPE} = \text{mass of object} \times \text{elevation of object} \times \text{acceleration due to gravity}$
8. **Kinetic Energy**: Energy of movement. The faster something is moving, the more kinetic energy it has. All matter has kinetic energy because matter is made up of molecules (atoms) which are constantly moving.
9. **Energy transformation / Energy Conversion**: When one form or type of energy changes into another form or type of energy. For example when a sledder slides down hill, his potential energy transforms / changes into kinetic energy. When you turn on a lamp, electrical energy transforms or changes into light and heat energy.
10. **Pendulum**: A weight (bob) attached to a string or wire, which swings back and forth. The longer the string of the pendulum, the longer the period of the pendulum.
11. **Period**: The amount of time it takes for a pendulum to complete one back and forth motion.
12. **Direct Relationship**: As one variable increases, the other variable also increases.
13. **Indirect Relationship**: As one variable increases, the other variable decreases.
14. **No Relationship**: As one variable increases, the other variable remains the same.
15. **Independent Variable**: The variable that scientists change or manipulate on purpose in an experiment. You can only change one variable on purpose in an experiment. All other variables must be controlled or kept constant.

16. **Dependent Variable**: This is the responding variable in an experiment because it responds to changes in the independent variable. Scientists measure changes in the dependent variable through out an experiment. It depends on the independent variable.
17. **Constant**: Something that does not change. In an experiment you are only allowed to change the independent variable on purpose; they must control all other variables (keep them the same).
18. **Law of Conservation of Energy**: Energy can change forms, but energy cannot be created or destroyed under ordinary conditions.

\* When ever energy changes forms, the total amount of energy remains the same. When ever energy changes forms, some energy is always released in the form of heat energy, so... an energy transformation will never be 100% efficient.

19. **Forms of energy**:

- a) **Mechanical Energy**: the energy associated with motion.
- b) **Heat Energy** : also called thermal energy. This is the energy that comes from the internal movement of atoms. All matter is made up of atoms, which are constantly moving. The faster the atoms move, the more heat energy there is. The heat energy is caused from the friction generated when the moving atoms rub against each other.
- c) **Chemical Energy**: The energy required to bond atoms together. When the bonds holding atoms together get broken, chemical energy is released. We use the chemical energy stored in food for energy. We use the chemical energy stored in gasoline to power our cars.
- d) **Electromagnetic Energy**: Has both electric and magnetic properties. It is the type of energy that moving electric charges have.
- e) **Nuclear Energy**: Stored in the nucleus of atoms. It is the most concentrated form of energy because you can get the most energy from the smallest amount of fuel. There are two types of nuclear energy.
  1. **Nuclear Fission**: When one nucleus splits into 2 or more nuclei. Power plants use this type of nuclear energy- it produces hazardous wastes.
  2. **Nuclear Fusion**: When two or more nuclei join or fuse together to form one large nucleus. This is the type of nuclear reaction that happens on the sun.

20. **Friction**: A force that resists motion (works in the opposite direction of motion). Friction is caused when two objects rub against each other. Friction generates heat.

## 21. Sources of Energy:

Name of energy you get from the source	Source of energy (where the energy comes from)
Thermal Energy	Heat
Geothermal Energy	Heat energy from hot rocks deep inside the Earth
Solar Energy	The sun
Hydro-Electric Energy	Moving water that is used to turn a turbine, which allows a generator to make power
Chemical Energy	Chemical bonds
Nuclear Energy	Nucleus of an atom
Electrical energy, heat energy, light energy	Fossil fuels
Wind energy – electrical energy	Wind that is used to turn a turbine which allows a generator to make power.

22. **Fossil Fuels:** Coal, Oil, and Natural Gas. These important natural resources were formed from the decayed remains of plants and animals that lived millions of years ago. Fossil fuels release their stored energy when they are burned in a process called combustion (the burning of fossil fuels). When fossil fuels are burned, they not only release energy, but also pollutants. The burning of fossil fuels releases a variety of chemicals into the air, including Carbon Dioxide, which is a green house gas, which is one of the main causes of global warming (global climate change).
23. **Generator:** Machine that converts mechanical energy into electrical energy.
24. **Momentum:** All moving objects have momentum. Momentum depends on the mass of the object and the velocity with which it is moving. The more momentum an object has, the more difficult it is to stop the object. Momentum does not get destroyed – it just gets transferred from one object to another.  
**Momentum = mass x velocity**
25. **The Law of Conservation of Momentum:** The total momentum of a group of objects will remain constant unless they are acted on by an outside force.