

WHAT IS ENERGY?

Energy is the ability to cause a change. Work is done when a **force moves an object through a distance**. Energy is measured in **joules**.

Energy is found in different forms, such as light, heat, sound and motion. There are many forms of energy, but they can all be put into two main categories, **kinetic** and **potential**.

Kinetic Energy

Kinetic energy is defined as the energy of motion: of objects, waves, electrons, atoms, molecules, and other substances. Basically, the more mass a moving object has, the more kinetic energy it has. In addition, the more velocity a moving object has, the more kinetic energy it has. The equation:

$$\text{Kinetic energy} = \frac{1}{2} \times \text{mass} \times \text{velocity}^2$$

$$\text{KE} = \frac{1}{2}mv^2$$

There are different types of kinetic energy, which are summarized below:

Forms of Kinetic Energy	
Electrical Energy	A type of energy caused by the movement of electrons in a current. Electrons moving through a wire is called electricity. Lightning is another example of electrical energy.
Radiant Energy	A type of energy caused by the movement of electromagnetic waves. Radiant energy includes visible light, x-rays, gamma rays and radio waves. Light is one type of radiant energy.
Thermal Energy	A type of energy in particles in matter due to their random motion.
Mechanical Energy	The total energy of an object or group of objects due to large-scale motions and interactions. Wind is an example of motion energy.
Sound Energy	A type of energy caused by the movement of sound (longitudinal) waves. Sound is produced when a force causes an object or substance to vibrate - the energy is transferred through the substance in a wave.

Potential Energy

Potential energy is when something has energy simply because of its position or its shape. For example, when you raise a book up high or compress a spring or coil, you give the object potential energy.

There are different types of potential energy, which are summarized in the following table:

Forms of Potential Energy	
Chemical Potential Energy	The energy stored in the bonds of atoms and molecules. It is the energy that holds these particles together. Biomass, petroleum, natural gas, and propane are examples of stored chemical energy.
Elastic Potential Energy	The energy stored when objects are compressed or stretched. Compressed springs and stretched rubber bands are examples of stored energy.
Nuclear Potential Energy	The energy stored in the nucleus of an atom. It is the energy that holds the nucleus together. The energy can be released when the nuclei are combined or split apart. Nuclear power plants split the nuclei of uranium atoms in a process called fission .
Gravitational Potential Energy	The energy stored between any object and the Earth. A rock resting at the top of a hill contains gravitational potential energy. Gravitational potential energy, or GPE, depends on the height of the object above the Earth.

Calculating Gravitational Potential Energy

Gravitational potential energy, or GPE, depends on the height of the object above the Earth. For objects near the surface of the Earth, GPE is equal to the object's mass multiplied by the acceleration of all objects on Earth (equal to 9.8 m/s^2) multiplied by the height the object is off the ground or other surface.

Gravitational potential energy = mass x gravitational constant (9.8 m/s^2) x height

$$\text{GPE} = mgh$$

REVIEW QUESTIONS – WHAT IS ENERGY?

1. Define energy.

2. What are the two general kinds of energy?

--	--

3. What is kinetic energy?

4. The kinetic energy of an object depends on two things. List them.

--	--

5. What formula do you use to calculate kinetic energy?

6. Fill in the table below to summarize the different types of kinetic energy.

Type of Kinetic Energy	Description
	A type of energy caused by the movement of electrons.
radiant energy	
thermal energy	
	Caused by the movement of energy in longitudinal waves.

7. What is potential energy?

8. Fill in the table below to summarize the different types of potential energy.

Type of Potential Energy	Description
	A type of energy that depends on an object's height.
Elastic potential	
	A type of energy that is stored in the nucleus of an atom.
	A type of energy stored in the bonds of atoms and molecules.

9. What formula do you use to calculate gravitational potential energy?

10. How do you determine an object's mechanical energy?

Match each illustration with the correct form of energy by writing the letter or letters of the form(s) of energy on the line below each illustration.

- | | | |
|----------------------|--------------------|-----------------|
| a. electrical energy | b. nuclear energy | c. radiant |
| d. thermal energy | e. chemical energy | f. sound energy |



11.	12.	13.
-----	-----	-----