

Lesson #1: What is Energy?

Key Concepts:

- **What is energy?**
- **How do we describe energy?**

Energy is the ability to do **work**. The word ability means that work may not be done **right now**, but rather there is a condition set up that work could get done.

In physics, work is defined as a **force** pushing a mass a distance. So energy is the condition in which there could be a force acting on a **mass** to cause it to move.

What are some things you would need to get a mass to move?

A force that could be a **push, pull, spin, drop, etc.**

Energy is not something we can **see touch taste or feel**, rather we observe the effects it has on mass. Energy is broken down into two categories:

Kinetic Energy: **Moving** energy. We see the effects of this energy causing matter to move.

Potential energy: **Stored** energy. We know there is the potential to create movement, but the mass is not actually moving.

There are many different types of kinetic and potential energies:

Kinetic Energy	Potential Energy
Mechanical , a mass moving	Mechanical, a mass lifted up
thermal , Moving particles(heat)	Change of state , solid to liquid, etc.
	Nuclear energy
Light Energy	
	Chemical Energy

Newtons (N) : The international unit of force. 1N = the force required to accelerate a 1kg mass to 1m/s^2 .

Joules (J): The international unit of energy. 1J = the work done on an object if 1N force moves an object 1m.

Energy is measured in Joules, J. Some common measures of energy:

Falling snowflake	650 nJ
Falling Raindrop	850 μJ
Apple in digestive track	270 kJ
Television running for 4 hours	1.4 MJ
Nuclear Bomb	63TJ

How can you tell if something you observe is energy?

Since energy is something you cannot see directly, we look for **some effects** that there is energy present. For example, if an object is moving, then there is energy involved causing it to move.

For other cases, like a **rock** perched over a cliff, it is harder to see the effect of energy. In the case of the rock, it is not moving, but it still has energy, because there is a **possibility** it could still move. This is easier seen in an example of food. We get energy from food, and we consider food as energy, but it is not moving. In both cases of food and the rock, we are looking at potential energy. It is a stored energy.

Videos:

Types of energy

<https://www.youtube.com/watch?v=FX7T-QYTPho>