

# Describing Energy



A moving pole vaulter has kinetic energy. The bent pole has potential energy.

Things move and change all the time. Why? The answer is energy. Energy is the ability to do **work** or cause change. There are two kinds of energy, **kinetic energy** and **potential energy**.

Kinetic energy is the energy of motion. Larger moving objects have more kinetic energy than smaller objects moving at the same speed. Faster moving objects have

more kinetic energy than slower moving objects with the same mass.

An object does not have to be moving to have energy. Non-moving objects can have potential energy. Potential energy is stored energy, or energy that is not being used.

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**work** – the result of a force moving an object in the direction of the force  
**kinetic energy** – the energy of motion  
**potential energy** – stored energy

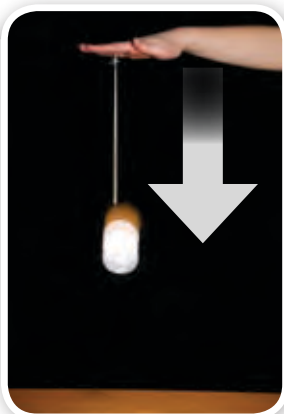
An object can have stored energy because of its condition. Photo A shows the string wound around the yo-yo's center. The wound string gives the yo-yo the potential to spin as it unwinds and rewinds.

An object can also have potential energy due to its position. Before a yo-yo is dropped it has potential energy due to position.

Photos B, C, and D show how the yo-yo's energy can change from potential to kinetic energy, or from kinetic to potential energy.



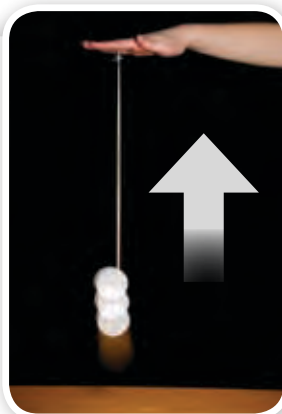
**A** A yo-yo can have potential energy due to position and due to condition.



**B** Potential energy can change to kinetic energy.



**C** Potential energy due to position is zero.



**D** Kinetic energy can change to potential energy.


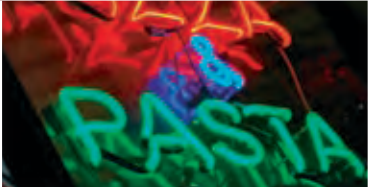




**KEY IDEA** There are two kinds of energy, kinetic energy and potential energy.

# Different Forms of Energy

Kinetic energy and potential energy can be found in many different forms.

The chart below summarizes some important forms of energy.

**vibrations** – quick back and forth movements

Form of Energy	Description	Example
Thermal	Energy resulting from the movement of particles of matter	
Light	Energy we can see that can travel through space	
Chemical	Energy produced in some kinds of matter	
Electrical	Energy stored inside the particles of some kinds of matter	
Mechanical	The sum of an object's kinetic and potential energy	
Sound	Energy formed by <b>vibrations</b> that can be heard	

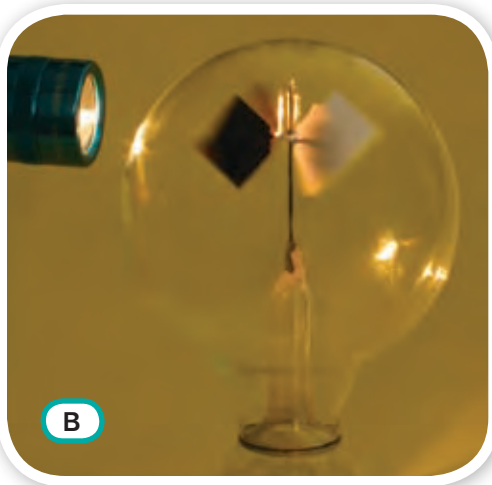
## Changes in Energy Form Produce Heat

Energy often changes from one form to another. Look at photos A and B. When the flashlight is turned on, light energy travels through the glass. Some of the light energy changes to mechanical energy, which makes the toy's arms turn.

Nearly every change in energy form produces heat. As a light bulb changes electrical energy to light energy, the light bulb also produces **heat**. Heat is the transfer of energy from an object with a higher temperature to an object with a lower temperature.

**heat** – the transfer of energy from a higher-temperature object to a lower-temperature object

**SHARE IDEAS** Compare the toy's arms in photos A and B. Explain what has happened.



▲ **Light energy changes to mechanical energy in this spinning toy.**

**KEY IDEAS** There are many forms of energy. A change from one form of energy to another can produce heat.





▲ **Conduction**  
transfers heat  
through many  
different solids.



▲ **Convection**  
transfers heat  
through liquids  
and gases.



▲ **Radiation**  
transfers heat  
through air or  
empty space.

Heat transfer can occur in three different ways: by **conduction**, **convection**, or **radiation**.

Conduction transfers heat through the tiny particles that make up matter. Heat moves through most solids by conduction. Metals are good heat conductors. Wood and plastic are poor heat conductors.

Heat moves through many liquids and gases by convection. The hotter liquid or gas rises while the cooler liquid or gas sinks.

Radiation transfers heat through air or empty space. Matter is not needed. Heat from the sun travels through space to warm Earth by radiation.

**KEY IDEA** Heat transfer can occur by conduction, convection, or radiation.