

## Kinetic and Potential Energy

Most of us think of energy as the power our bodies have to move or do work. We have a lot of energy when we are rested or excited, and less energy when we are tired or bored. But that is only one kind of energy. Energy is working all around us. It powers cars and gives us light. Energy keeps us warm and creates sound. Without energy, we could not grow, move, or even stay alive! To understand energy and how it helps make life possible, we must learn that there are two kinds of energy: kinetic and potential.

### Kinetic

“Kinetic” is another word for “motion.” Scientists use it to define energy that is moving. For example, waves in the ocean have kinetic energy, because they are moving. Something as big as a plane in flight has kinetic energy, but size is not important. Atoms, which are the tiniest particles of matter, are also in motion. They have kinetic energy, too.

Kinetic energy can appear in many forms.

- **Radiant energy** is kinetic energy that shows up as light, radio waves, and x-rays.
- **Thermal energy** is kinetic energy that we call “heat.” Heat is actually caused by the movement of vibrating molecules.
- **Electrical energy** is kinetic energy that exists in the movement of electrical charges. Lightning and the electricity that powers your home are two examples.
- **Sound** is also kinetic energy. It is created when a force causes an object or other matter to vibrate. We hear sound because force causes our eardrums to move.
- **Motion energy** is the simplest form of kinetic energy. It comes from the movement of matter from one place to another. Water flowing is an example of motion energy. So is wind.

### Potential Energy

Scientists believe that energy is not created or destroyed. It simply gets transferred from one object or substance to another. So, if an object is not moving, how can it have energy? The other category of energy is **potential energy**.

You might have learned that the word potential means a person has the ability to succeed. If you have great potential, you will likely reach your goals. Potential energy has the *ability* to become kinetic energy. Potential energy is *stored* energy that will possibly become energy in motion. It is also the “energy of position,” which means that an object’s power comes from gravity.

Potential energy also appears in several forms.

- **Gravitational energy** comes from the potential power gravity can have on the object. Before he jumps from a plane, a skydiver has a great deal of stored, gravitational energy. He has *more* gravitational energy than a bungee jumper, because he is much higher.

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## Kinetic and Potential Energy (Cont'd)

- **Chemical energy** is stored inside of atoms and molecules. These tiny particles are held together with bonds that have stored or “chemical” energy.
- **Stored mechanical energy** is energy that is stored in an object before a force causes it to move. For example, when a rubber band is stretched, it has stored mechanical energy, or the potential to be in an object in motion.
- **Nuclear energy** is stored in the information center of an atom: the nucleus. The nucleus is like the brain of an atom, and directs all of its activities. It is held together by a powerful energy. When a nucleus is divided or combined with another nucleus, this potential energy becomes one of the most powerful forces in the universe.

### Summing Up

Scientists tell us that all energy is in motion, or has the potential to be in motion. Even objects that appear to be perfectly still have stored energy. This energy changes from potential to kinetic when it is acted upon by some force. Scientists have learned to harness this power and release energy when it is needed. In order to make sure our planet lives for a long time, scientists continue to look for ways to safely store, use, and recycle energy. The exercises on the next page will help you better understand the differences between kinetic and potential energy.

Name \_\_\_\_\_

Date \_\_\_\_\_

## Kinetic and Potential Energy Questions

Read each question and circle the correct answer.

1. Energy appears in two forms. What are they?
  - A. Thermal and light
  - B. Kinetic and electric
  - C. Potential and kinetic
  - D. Stored and active
2. Kinetic energy can be described as:
  - A. Stored energy
  - B. Energy in motion
  - C. A chemical reaction
  - D. Connected energy
3. Which of the following is NOT an example of kinetic energy?
  - A. Gravity
  - B. Sound
  - C. Heat
  - D. Light
4. Which of the following is NOT an example of potential energy?
  - A. Gravitational pull
  - B. Nuclear energy
  - C. Chemical bonds
  - D. Electricity
5. Which of the following has no energy?
  - A. A wrecking ball
  - B. A pot of water
  - C. A moving vehicle
  - D. None of the above

Read the descriptions below and identify each activity as an example of potential or kinetic energy by writing "P" or "K" on the line.

1. The energy that exists before baking soda and vinegar combine to create carbon dioxide gas. \_\_\_\_\_
2. A child on his way down a playground slide. \_\_\_\_\_
3. Exploding fireworks. \_\_\_\_\_
4. Ocean waves. \_\_\_\_\_
5. A stunt driver at the top of a ramp. \_\_\_\_\_
6. The flexed string of an archer's bow. \_\_\_\_\_
7. Boiling water. \_\_\_\_\_
8. A glowing neon sign. \_\_\_\_\_
9. The sun. \_\_\_\_\_
10. The bond between hydrogen and oxygen that creates water. \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

## Kinetic and Potential Energy Answers

### Multiple Choice

1. C
2. B
3. A
4. D
5. D

### Identification

1. P
2. K
3. K
4. K
5. P
6. P
7. K
8. K
9. K
10. P