

Energy Help Sheet

Confused about energy? This worksheet contains 4 sections, with each containing a small dose of information followed by a “Check your understanding section.”

Section 1: Potential and Kinetic Energy

Section 2: Specific Types of Energy

Section 3: More Energy Terms

Section 4: Conservation of Energy

Section 1: Potential and Kinetic Energy

The two broad categories of energy are potential and kinetic. Let's examine these first, then we'll identify specific types of each.

Potential Energy- stored energy

Kinetic Energy- energy of motion

Check your understanding: Identify each of the following as potential energy or kinetic energy:

- | | | |
|---|----|----|
| 1. The blades of a windmill rotating | PE | KE |
| 2. A gallon of gasoline in your gas tank | PE | KE |
| 3. 3 million gallons of water behind a dam | PE | KE |
| 4. 6 amps of electricity going into your hair dryer | PE | KE |
| 5. The sun's rays hitting your back | PE | KE |

Write down your answers, and then scroll to the next page to check yourself.

Section 1 continued: Potential and Kinetic Energy

Identify each of the following as potential energy or kinetic energy:

1. The blades of a windmill rotating PE **KE**
Since the blades of the windmill are moving, this is considered kinetic energy. Specifically, this is an example of mechanical energy.
2. A gallon of gasoline in your gas tank **PE** KE
The gasoline has a lot of energy that is waiting to be unleashed, when it gets pumped into your car's engine and burned (exploded). This type of stored energy is called chemical energy.
3. 3 million gallons of water behind a dam **PE** KE
The water has a lot of energy that is waiting to be released, when the gates of the dam are opened. The water has gravitational potential energy.
4. 6 amps of electricity going into your hair dryer PE **KE**
To make the hair dryer work, electricity must flow into it. Looking more closely, electricity is the flow of electrons. The electrons are in motion, so this is considered kinetic energy.
5. The sun's rays hitting your back PE **KE**
The electromagnetic waves move from the sun to your back, so this is energy of motion, or kinetic energy.

Section 2: Specific Types of Energy

As mentioned before, the two broad categories of energy are potential and kinetic. Now, let's identify specific types of each.

Chemical- food, gasoline, coal, wood, and other substances contain stored energy that can be released through metabolism (inside a living thing) or burning them.

Mechanical- a moving object has mechanical energy; examples include a turbine spinning, a swinging bat, the crankshaft of your car turning.

Electromagnetic Radiation- this form of energy is carried by electromagnetic waves which move from one place to another; examples include light (from the sun or light bulbs), x-rays, and gamma rays.

Gravitational- a book raised off the desk or water behind a dam both contain gravitational potential energy; this is energy due to the object's position.

Thermal- the energy associated with the movement of the individual particles in an object or substances.

Electrical- the energy associated with the movement of electrons.

Nuclear- there is a tremendous amount of energy stored in the nucleus of atoms.

Stored Mechanical- a stretched spring or rubber band are good examples of stored mechanical energy waiting to be released.

...and there are other types of energy not listed here.

Check your understanding: Take the eight types of energy above and put them into the proper column in the table below:

<u>Potential (stored energy)</u>	<u>Kinetic (energy of motion)</u>

Write down your answers, and then scroll to the next page to check yourself.

Section 2 continued: Specific Types of Energy

Here is the completed chart:

<u>Potential (stored energy)</u>	<u>Kinetic (energy of motion)</u>
<u>Chemical</u> - food, gasoline, coal, wood, and other substances contain stored energy that can be released through metabolism (inside a living thing) or burning them.	<u>Mechanical</u> - a moving object has mechanical energy; examples include a turbine spinning, a swinging bat, the crankshaft of your car turning.
<u>Stored Mechanical</u> - a stretched spring or rubber band are good examples of stored mechanical energy waiting to be released.	<u>Thermal</u> - the energy associated with the movement of the individual particles in an object or substances.
<u>Gravitational</u> - a book raised off the desk or water behind a dam both contain gravitational potential energy; this is energy due to the object's position.	<u>Electromagnetic Radiation</u> - this form of energy is carried by electromagnetic waves which can move from one place to another; examples include light (from the sun or light bulbs), x-rays, and gamma rays.
<u>Nuclear</u> - there is a tremendous amount of energy stored in the nucleus of atoms.	<u>Electrical</u> - the energy associated with the movement of electrons.

...and there are other types of energy not listed here.

Section 3: More Energy Terms

Energy Transfer- when energy moves from one substance/object to another

Energy Transformation- when energy of one type is turned into energy of another type (e.g. wind energy is transformed into electrical energy by a wind turbine); energy transformation is sometimes referred to as energy conversion; note that 'trans' comes from the Latin, meaning 'over.')

trans - form

cross over from one form to another

Check your understanding: Identify each of the following as an energy transformation or energy transfer

6. You pick up a piece of room temperature metal with your hand
7. A wind turbine spins, producing electricity
8. You put a big pot of hot soup in your refrigerator
9. You get a 'hot pack' from the first aid kit and squeeze it to break the tube inside
10. You put the hot pack on your aching leg

Write down your answers, and then scroll to the next page to check yourself.

Section 3 continued: More Energy Terms

Check your understanding: Identify each of the following as an energy transformation or energy transfer

6. You pick up a piece of room temperature metal with your hand
Thermal energy from your hand is transferred into the piece of metal.
7. A wind turbine spins, producing electricity
Wind energy (movement of air molecules) is transformed into mechanical energy (turning the shaft). The mechanical energy is transformed into electrical energy.
8. You put a big pot of hot soup in your refrigerator
Thermal energy from the soup is transferred into the air and other food in your refrigerator.
9. You get a 'hot pack' from the first aid kit and squeeze it to break the tube inside
Chemical energy in the hot pack is transformed into thermal energy.
10. You put the hot pack on your aching leg
The thermal energy in the hot pack is transferred into your leg.

Section 4: Law of Conservation of Energy

The law of conservation of energy says that energy is neither created nor destroyed.

Energy can, however, be transferred from one place to another (or one object/substance to another). Energy can also be transformed from one type to another type.

Check your understanding: For each of the following, identify an energy transformation involving 2 or more types of energy present (2 or more for each):

11. A gas stove
12. A microwave
13. Solar calculator
14. Car
15. Electric motor

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Check your understanding: For each of the following, identify an energy transformation involving 2 or more types of energy present (2 or more for each):

11. A gas stove
chemical energy => thermal energy
12. A microwave
electrical energy => electromagnetic energy => thermal energy
13. Solar calculator
electromagnetic energy (solar) => electrical energy
14. Car
chemical energy (gasoline) => thermal energy => mechanical energy
15. Electric motor
electrical energy => mechanical energy