

LESSON | What is energy?

17

Look around. How many things do you see moving?

What makes something move? Why does a rowboat drift downstream? Why do fallen leaves fly around? What lifts a rocket off of the ground? Why can you turn the page of this book?

Objects move because of energy. We say, therefore, that **energy** is the ability to make things move.

Energy is not like matter. Matter has mass and takes up space. Energy has no mass and does not take up any space.

There are seven forms of energy. They are:

- **CHEMICAL ENERGY** Chemical energy is what holds the atoms in molecules together. It can be released by chemical reactions, like burning wood.
- **ELECTRICAL ENERGY** Electrical energy is the movement of electrons through matter. Electricity is a form of electrical energy.
- **HEAT ENERGY** Heat energy is the vibration of particles within matter. The faster the particles vibrate, the more heat energy they have.
- **LIGHT ENERGY** Light energy is the energy carried by light.
- **MECHANICAL ENERGY** Mechanical [muh-KAN-i-kul] energy is the energy of moving things.
- **NUCLEAR ENERGY** Nuclear [NEW-klee-ur] energy holds protons and neutrons together in the nucleus of atoms. This energy powers the sun and nuclear power plants.
- **SOUND ENERGY** Sound energy vibrates air molecules. The vibrating molecules move tiny bones in your ear. The message of sound then moves to your brain. This is how you hear. Sound energy vibrates all forms of matter.

Energy can be changed, or converted, from one form to another. For example, the chemical energy in gasoline is changed into heat energy in the engine of a car. This heat energy is then converted into mechanical energy to move the car.

FORMS OF ENERGY

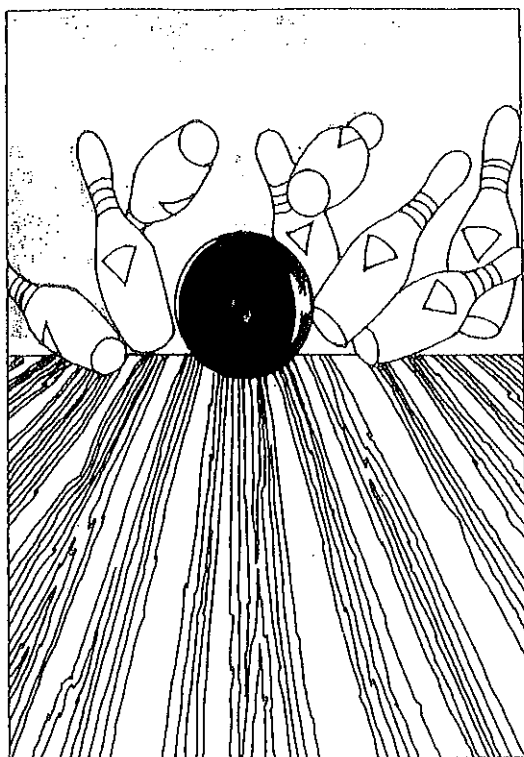


Figure A Mechanical energy

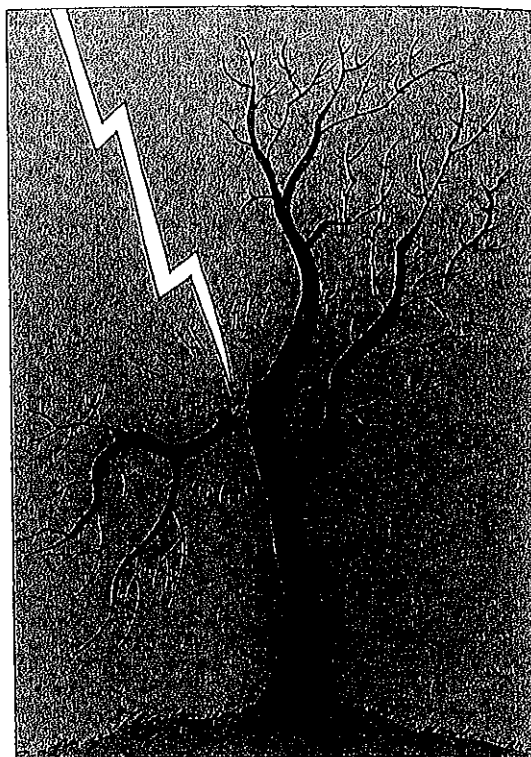


Figure B Electrical energy

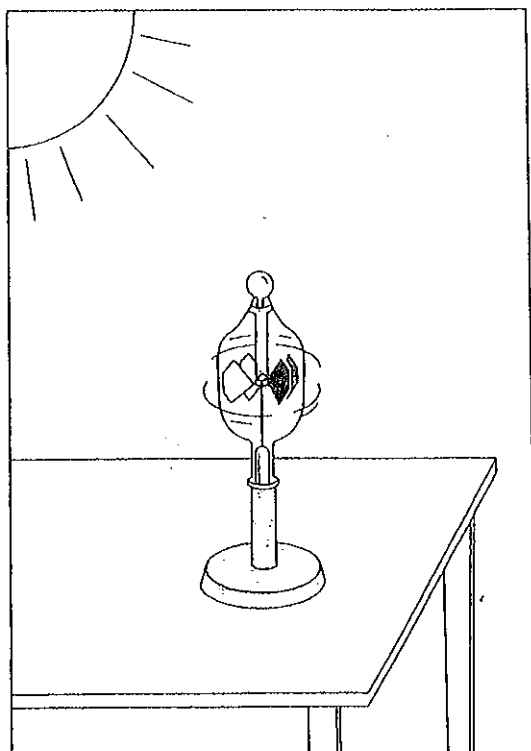


Figure C Light energy
A radiometer turns when light hits it.

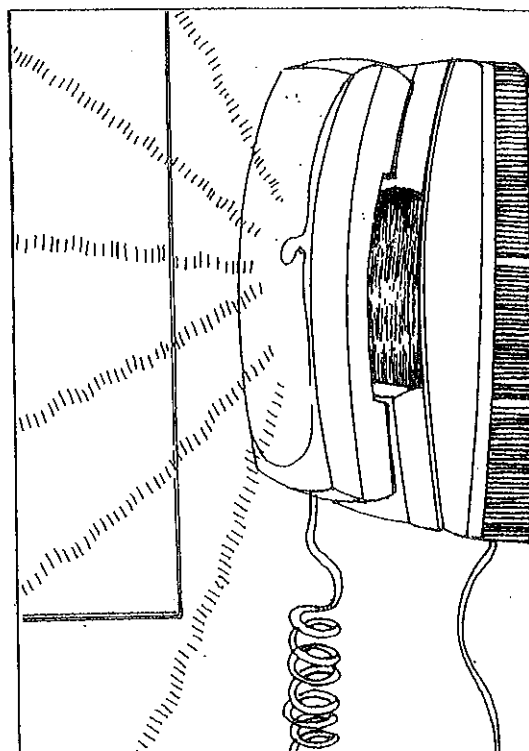


Figure D Sound energy

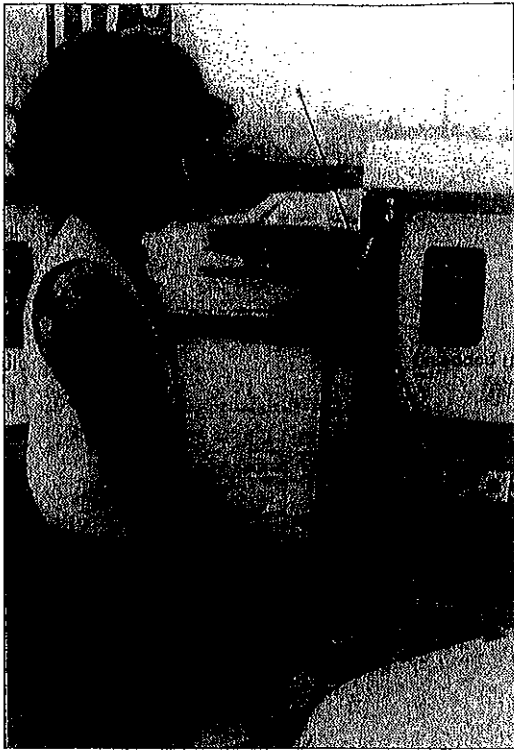


Figure E Chemical energy

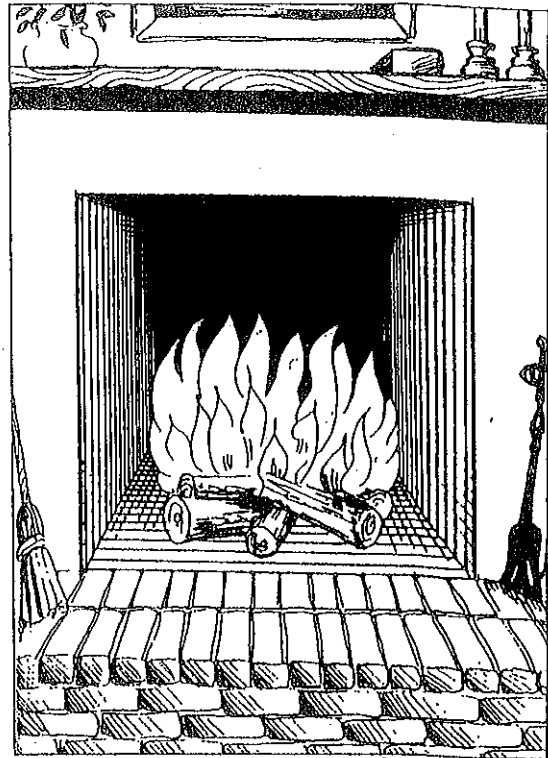


Figure F Heat energy

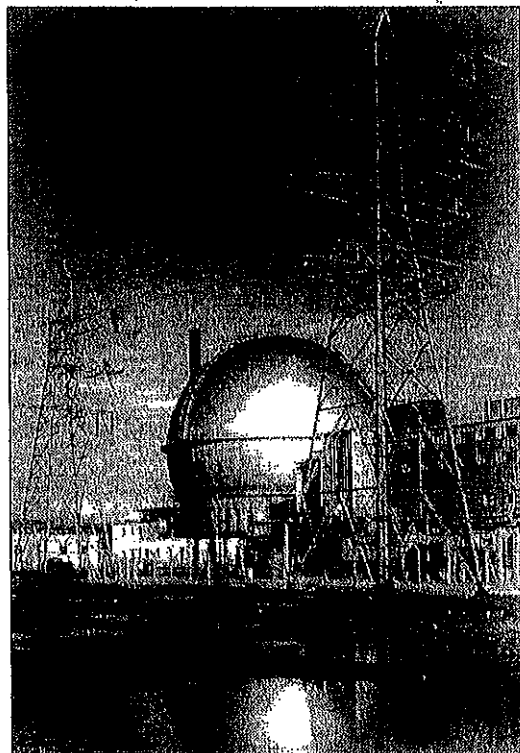


Figure G Nuclear energy

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

heat
mechanical
nuclear
move

chemical
energy
sound
mass

electrical
space
light

1. The ability to make things move is called _____.
2. The main forms of energy are _____,
_____,
_____ and _____.
3. The energy of moving things is called _____ energy.
4. Moving things can make other things _____.
5. Thunder is an example of _____ energy.
6. Matter has _____ and takes up _____.
7. _____ has no mass and does not take up space.

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. Energy makes things move.
- _____ 2. Only moving things have energy.
- _____ 3. There is only one form of energy.
- _____ 4. Everything has the same amount of energy.
- _____ 5. Living things need energy.
- _____ 6. Air molecules can vibrate.
- _____ 7. Electrical energy powers the sun.
- _____ 8. Nuclear energy powers the sun.
- _____ 9. Energy takes up space and has mass.
- _____ 10. Matter and energy are the same.

COMPLETING SENTENCES

Choose the correct word or term for each statement. Write your choice in the spaces provided.

1. _____ has mass and takes up space.
Matter, Energy
2. _____ makes things move.
Matter, Energy
3. Wind moving a windmill is an example of _____ energy.
atomic, mechanical
4. Humans have organs to detect _____ energy.
sound, electrical
5. Plants take light from the sun and store it as _____ energy.
chemical, atomic

WORD SCRAMBLE

Below are several scrambled words you have used in this Lesson. Unscramble the words and write your answers in the spaces provided.

1. GREYEN

2. ONUDS

3. TAMRET

4. HITLG

5. LAMCHINBCA

REACHING OUT

There is a limited amount of energy available on Earth. Why is it important that people conserve energy?

LESSON 18 | What are potential and kinetic energy?

A roller coaster speeds along its track. It has energy because it is moving. The energy of its motion is called kinetic [ki-NET-ik] energy. **Kinetic energy** is energy in action.

The roller coaster sits at the top of a hill. It is just about to speed down the track, but has not yet done so. It has energy because of where it is. This energy is called potential energy. **Potential energy** is stored energy that is not being used.

Substances like wood, coal, oil, and gasoline have stored energy because of their chemistry. They can burn. When they burn, they give off heat and light energy.

POTENTIAL ENERGY can be changed to KINETIC ENERGY.

Also, KINETIC ENERGY can be changed to POTENTIAL ENERGY.

The potential energy of the roller coaster when it is at the top of a hill is converted into kinetic energy as the roller coaster speeds down the hill. As the roller coaster goes up another hill, it slows down. The kinetic energy is converted into potential energy.

POTENTIAL OR KINETIC

Do Not Write On This!

Look at figures A-F. Write "potential energy" or "kinetic energy" on the correct lines.

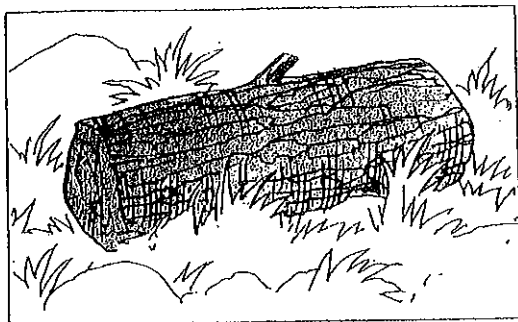


Figure A

1. _____

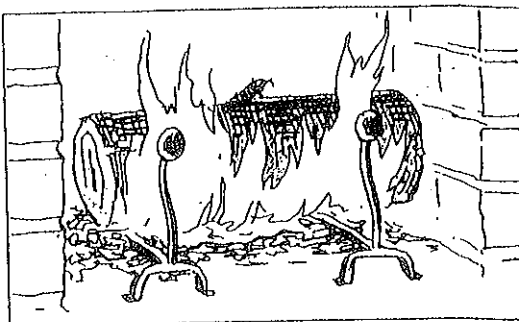


Figure B

2. _____

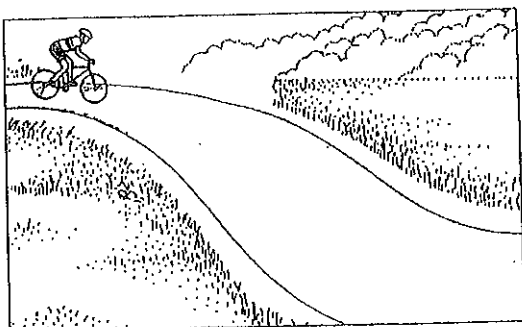


Figure C

3. _____

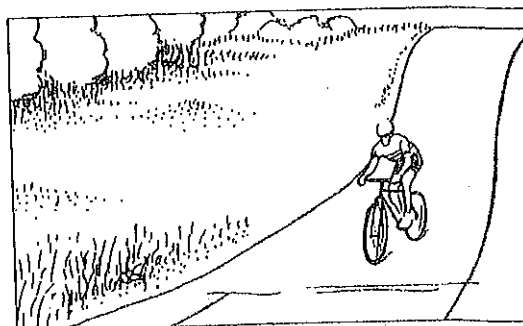


Figure D

4. _____

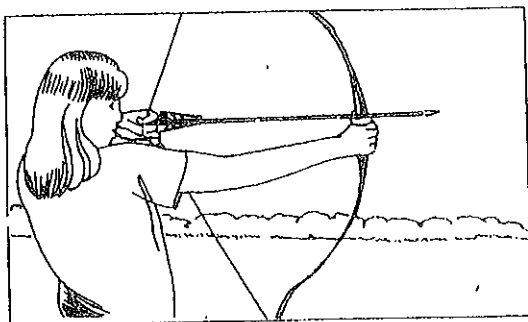


Figure E

5. _____

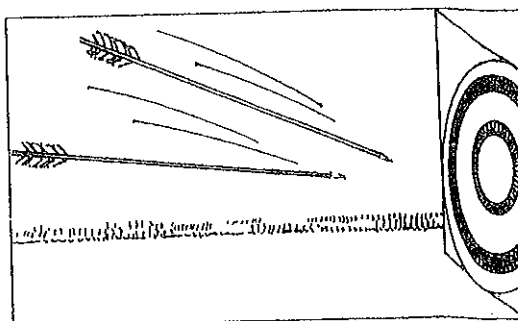


Figure F

6. _____

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

chemistry
potential
burning coal

piece of coal
energy
position

kinetic
motion

1. The ability to make things move is called _____.
2. Stored energy is called _____ energy.
3. Energy of motion is called _____ energy.
4. Potential energy can change to _____ energy.
5. A _____ has potential energy.
6. _____ has kinetic energy.
7. Matter has potential energy because of its _____ or its _____.
8. A car at the top of a hill has potential energy because of its _____.
9. Fuel oil has potential energy because of its _____.
10. Matter has kinetic energy because of its _____.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
_____ 1. potential energy	a) energy in action
_____ 2. kinetic energy	b) has potential energy because of position
_____ 3. roller coaster car on top of a hill	c) stored energy
_____ 4. change	d) has potential energy because of chemistry
_____ 5. oil	e) conversion

DIFFERENCES IN POTENTIAL ENERGY

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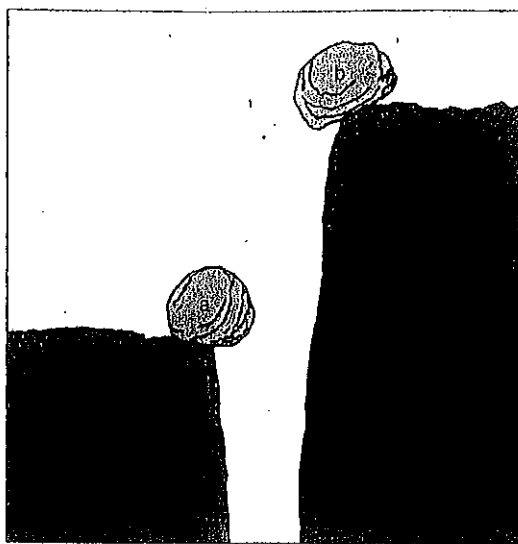


Figure G

Look at the two rocks in Figure G. Rocks A and B are the same size and have the same mass. Rock B is higher than rock A. Therefore, rock B has more potential energy than rock A. The higher an object is, the more potential energy it has.

TRUE OR FALSE

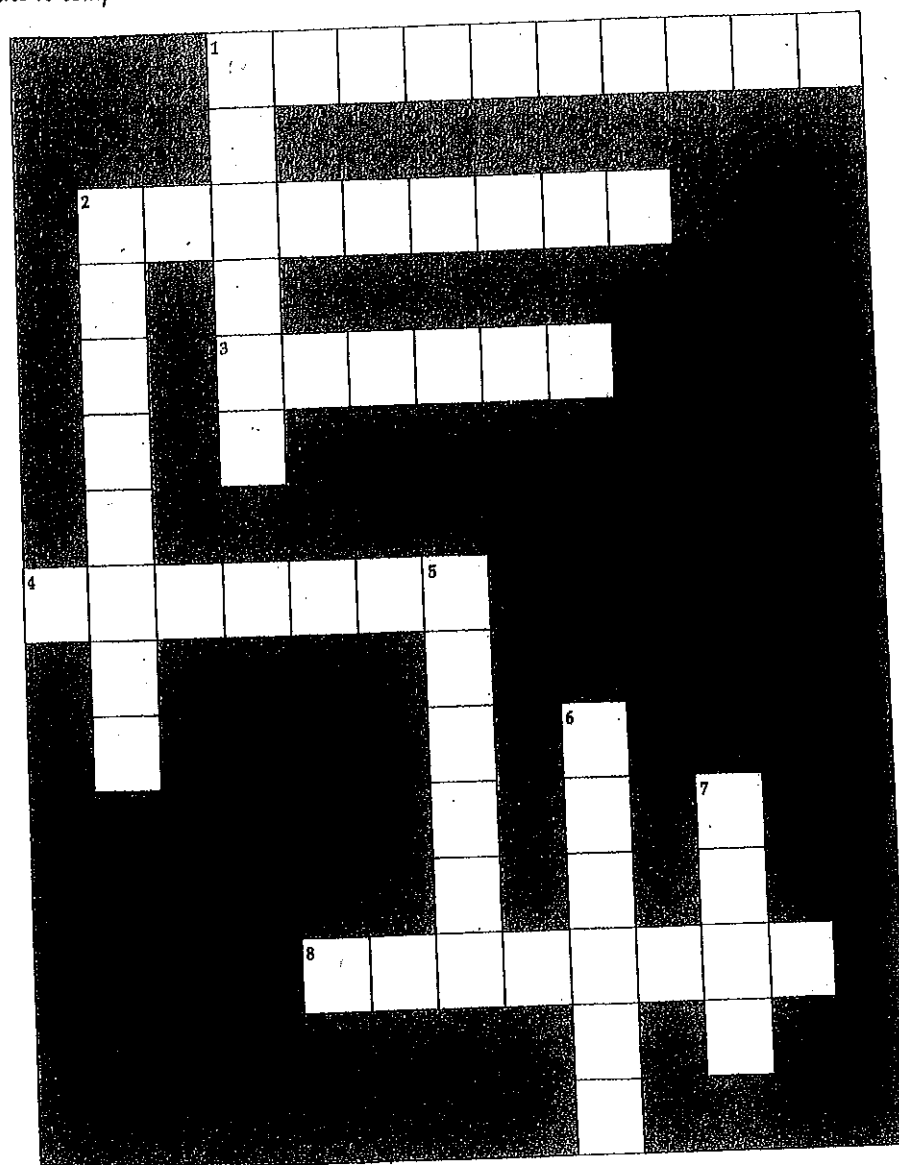
In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. Objects that are higher have less potential energy.
- _____ 2. Objects that have kinetic energy do not move.
- _____ 3. Energy of position is potential energy.
- _____ 4. In Figure G, rock B has more potential energy.
- _____ 5. Potential energy and kinetic energy are the same.
- _____ 6. Potential energy can be changed into kinetic energy.
- _____ 7. A thrown baseball has kinetic energy.
- _____ 8. A match that has not been lit has potential energy.
- _____ 9. A lit match has potential energy.
- _____ 10. A car racing up a hill has kinetic energy.

CROSSWORD PUZZLE

Use the clues to complete the crossword puzzle.

Do Not Write on This!



Clues

Across

1. energy of moving things
2. stored energy
3. ability to make things move
4. energy in action
8. energy that holds atoms in molecules together

Down

1. things that have mass and take up space
2. Potential energy is energy of _____ or chemistry.
5. conversion
6. movement
7. given off when burning wood