

# Do Now

Finish the following sentence:

“Energy is the ability to \_\_\_\_.”

Write your completed sentence in your **science journal**. People often use the words *energy* and *power* synonymously, but they have specific meanings. What is the distinction between energy and power?

# Objectives

- ← **Explain** the relationship between energy and work.
- ← **Compare** kinetic energy and potential energy.
- ← **Describe** the different forms of energy.

# Agenda

- ▶ Today we will:
  - ▶ Learn about energy by teacher led discussion.
  - ▶ Work in groups to complete an energy activity
  - ▶ Exit ticket quiz.

# Vocabulary

- ▶ energy
- ▶ kinetic energy
- ▶ potential energy
- ▶ mechanical energy
- ▶ thermal energy
- ▶ chemical energy
- ▶ electrical energy
- ▶ sound energy
- ▶ light energy
- ▶ nuclear energy

# Energy and Work: Working Together

- ⬅ **Energy** is the ability to do work.
- ⬅ Work is done when a force causes an object to move in the direction of the force. Work is a transfer of energy.
- ⬅ Energy and work are expressed in units of joules (J).

# Energy and Work



*The tennis player does work and transfers energy to the racket. With this energy, the racket can then do work on the ball.*

# Kinetic Energy

← **Kinetic energy** is the energy of motion. All moving objects have kinetic energy.

← **Kinetic Energy Depends on Mass and Speed** If you know an object's mass ( $m$ ) and its speed ( $v$ ), you can calculate the object's kinetic energy

# Potential Energy

← **Potential energy** is the energy an object has because of its position.

← **Gravitational Potential Energy** The amount of gravitational potential energy that an object has depends on its weight and its height.



# Mechanical Energy

◀ **Mechanical energy** is the total energy of motion and position of an object. Both kinetic energy and potential energy are kinds of mechanical energy.

◀ The mechanical energy of an object remains the same unless it transfers some energy to another object.

◀ But even if the mechanical energy of an object stays the same, the potential energy or kinetic energy can increase or decrease.

# Thermal energy

- ✚ **Thermal Energy** is all of the kinetic energy due to random motion of the particles that make up an object.
- ✚ All matter is made up of particles that are always in random motion. So, all matter has thermal energy.
- ✚ Thermal energy increases as temperature increases and increases as the number of particles increases.

# Thermal Energy in Water



The particles in an ice cube vibrate in fixed positions and do not have a lot of kinetic energy.



The particles of water in a lake can move more freely and have more kinetic energy than water particles in ice do.



The particles of water in steam move rapidly, so they have more energy than the particles in liquid water do.

# Electrical and Sound Energy

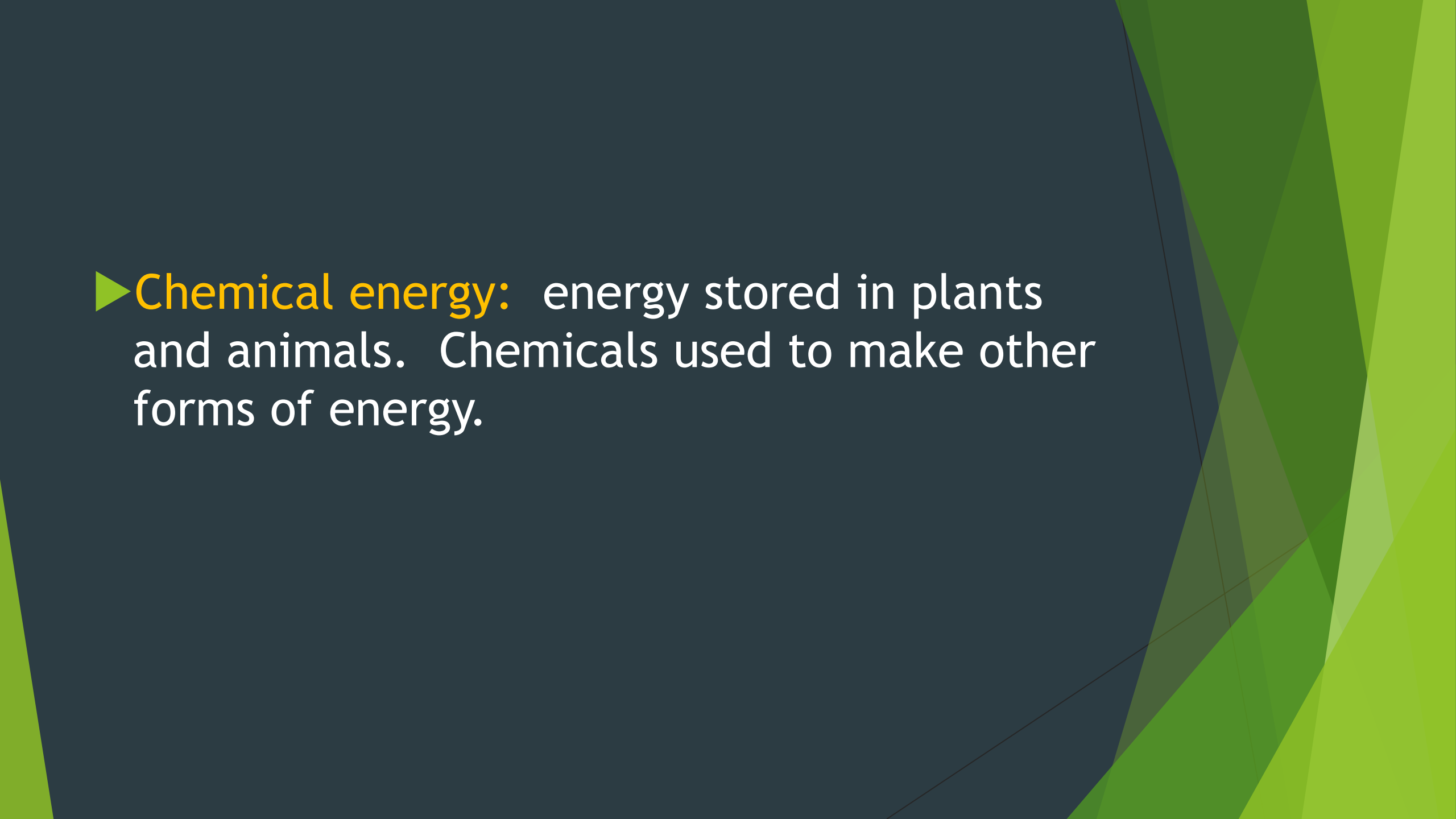
⬅️**Electrical Energy** is the energy of moving electrons. Electrical energy can be thought of as potential energy that is used when you plug in an electrical appliance and use it.

⬅️**Sound Energy** is caused by an object's vibrations. The object's vibrations transmit some kinetic energy to the air particles, which also vibrate. These vibrations transmit sound energy.

# Light Energy and Nuclear Energy

◀ **Light Energy** is produced by the vibrations of electrically charged particles.

◀ **Nuclear Energy** is energy that comes from changes in the nucleus of an atom. Nuclear energy can be produced when nuclei are joined in a fusion reaction or when a nucleus is split apart in a fission reaction.



► **Chemical energy:** energy stored in plants and animals. Chemicals used to make other forms of energy.

# Exit Ticket