

## Reflect

Shawn loves to play outside with his friends. His favorite sport to play is baseball. He plays wherever and whenever he can. When he is not outside playing, he is inside watching baseball on television. Sometimes, after his games, he has to use a heating pad on his shoulder because of soreness. Shawn's life seems to revolve around baseball.



So, what does baseball have to do with science? Everything.

### Matter and Energy

The baseball that Shawn loves to play with, as well as the bat and every other physical object in that game, is made of matter. Matter is anything that has mass and volume. Every physical object and substance in the known universe is made of matter. Matter is the building block of everything living and nonliving.



*This baseball is made of matter. The ability of this baseball to fly in the air is because of energy*

Matter is what everything is made of, but matter alone cannot do anything at all. Matter needs something to make it change, work, and move. That something is called energy. Energy is the ability that matter has to do change and do work. Without energy, matter is just “stuff” sitting still in space. Nothing would move or

work without energy. Just as everything that we touch and interact with on a daily basis is made of matter, our ability to interact with it at all is because of energy. Nothing can be done on Earth without energy.

There are several forms that energy can take. Some of these include mechanical, electrical, light, heat, and sound. Energy cannot be created or destroyed; rather, it just transforms from one form to another. These forms of energy can be found everywhere in our world.

*Mechanical energy* can be found in the wind and moving water. Light energy, as well as heat energy, can come from the Sun. Sound energy can come from almost anywhere we turn. Energy is all around us and always changing forms.

Mechanical energy is one of the most common types of energy found in the natural world.

# Forms of Energy

**Sound energy** is the energy that we can hear from vibrations. Matter is made of tiny pieces called molecules. When those molecules vibrate, they create noise. Have you ever listened to a band or a choir perform a piece of music? If so, you have heard different sounds and pitches. These pitches are different because of the rate of vibration that the instrument or voice is creating. You see, an object that vibrates slowly will produce a low-pitched sound. An object that vibrates quickly will produce a higher pitched sound. These vibrations can sometimes be so intense that they cause tables and floors to shake.

## What Do You Think?

A student comes home from school and decides he wants to watch television. He goes into the living room and turns on the television. After about 30 minutes, he begins to tire and falls asleep on the couch. He sleeps for an hour and wakes up to find the TV is still on. When he gets closer to turn it off, he can feel warmth coming from the TV and heat coming from the TV cable box. Why do you think he felt that?



*The television is a great example of how energy can be transformed in many ways.*



*A bicycle is an excellent example of an object that uses mechanical energy.*

## What are energy transformations?

The television in the story above is a great example of the fundamental rule of energy: Energy cannot be created or destroyed; rather, it can transform from one form to another. In this case, the TV used electrical energy from the wall plug and transformed that energy into light, sound, and eventually, heat. The television produced light in order to show the picture on the screen. Sound was produced because of vibrations in the speaker system. And over time, the light and electricity that was flowing through the TV produced heat energy that got released into the surrounding air. All this demonstrates that energy transforms in numerous ways. Many of the technologies that we enjoy every day are made possible because of energy.

# Forms of Energy

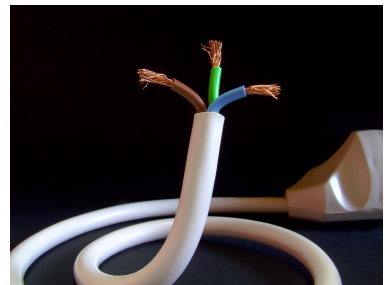
Water and air can be sources of energy, as well. When water and air move, they have the ability to grab objects and take them along for a ride. In Earth science terms, this is called erosion. Wind and water, when moving, possess an incredible amount of mechanical energy. This energy makes it possible to generate electricity from alternative energy sources such as wind and hydroelectric plants. As the wind and water move, so do turbines that gather the energy needed to power a generator.



*Moving water can be a source of energy as it carries objects.*

## Look Out!

Many people think that we create our own energy for our homes. Some of that thought comes from the word *generator*, which is the name of the device that is commonly used to transform other energies into electricity. However, keep in mind that energy cannot be created or destroyed. Every type of energy is a transformation of another type of energy.



*Plugs such as this one have a plastic coating on the outside of the wires to protect us from electric shock. Plugs insulate electrical energy.*

Also, some think that energy is lost when it is released, such as heat. This is also untrue. Heat energy is released all the time, whether by humans or by the Sun. Heat energy turns into other kinds of energy, such as mechanical. Have you ever wondered where wind comes from? It is not as if there were a giant fan in the sky, blowing air in all directions. Air moves because of temperature, which changes based on the amount of heat energy in a particular part of the atmosphere. Warmer air always rises above cooler air.

When cooler air moves in, the warmer air rises. When that happens, the cooler air sweeps in to replace the warmer air. The fast movement of that cooler air is felt as wind.

Electrical energy is special because it cannot flow, or move, unless there is an electrical conductor present. Have you ever wondered why plugs have plastic on the outside of them? That is because some materials, such as plastic and rubber, are very poor conductors of electricity. The plastic around the wires protects us from the harmful energy.

## Try Now

Take time to explore and identify the forms of energy that are around you at all times. Using the directions below and your student notebook, search through your house for different examples of the five forms of energy. Make sure you ask an adult's permission before you start.

1. Copy the example table shown below into your notebook.
2. With adult permission, take a trip throughout your house and look for as many examples of the forms of energy that you can find.
3. Write the examples into your table. Make sure to note whether the object or example is using or producing that form of energy.
4. Try to get three to five examples of each form of energy. There are several just in your house alone, and not all of them are technologies.
5. Read your results and reflect on them. What patterns did you see? Did anything surprise you? What did you learn about your everyday items?

Forms of Energy	Examples
<b>Mechanical energy</b>	
<b>Electrical energy</b>	
<b>Light energy</b>	
<b>Heat energy</b>	
<b>Sound energy</b>	

You may not have realized all the different forms of energy that you interact with on a daily basis. Many people take this for granted and never learn about the world around them. Energy is vital to our daily lives. Take a minute to brainstorm at least one thing for which you rely on technology. When you have thought of that, then try to do that thing without the technology. Could you do it? Why or why not?

## Connecting With Your Child

### Being Safe with Energy

As your child continues to grow up, there are more and more opportunities to study the various forms of energy in the world. Energy is a concept that is easier for younger children to understand than other concepts are. However, some of the worst misconceptions that exist have to do with energy.

One of the most common uses and forms of energy in the daily lives of children is electrical energy. With that being said, electrical energy is also one of the most dangerous types, along with heat energy.

Safety is important when it comes to these things. Many parents think that this is common sense and that children know not to stick metal objects into power sockets. However, common sense only develops through meaningful conversations with adults who have experience in life.

Talk with your child and come up with a safety plan for your house. Your child has most likely been taught lab safety in science class at school. Work with your child to come up with rules and procedures that the whole family can agree on in order to maintain safety in the home when dealing with energy.

**Here are some questions that you can ask your child while you are coming up with your safety plan:**

1. What is energy?
2. What forms does energy take?
3. What are some ways that energy is useful?
4. What are some ways that energy is dangerous?
5. What could we do without energy?