

Different Forms of Energy

Boy, it's so nice to get away from civilization.

What happened?

Looks like your generator ran out of gas.

And I didn't get to finish cooking my soup.

Well kids, what do you think we should do now?

I can help build a fire to make heat for your soup.

I'll go for some firewood.

I can't believe we ran out of gas for the generator. Rosa can't finish cooking her soup and dad's missing his favorite TV program. Lucky for me, I brought batteries for my laptop.

How is gas making all those things work?

Well, the gas is burning up and creating energy.

That's right. Just like gas is burned to make a car run. Or propane gas is burned for heating a home. There are many kinds of energy. Most people know about electrical energy, but there's also energy from heat, energy from light, and energy from sound. Oh and don't forget about chemical energy and mechanical energy, too. Now let's talk a little more about each of these forms of energy.

Mechanical energy is the kind of energy something has because it is moving, or because it can move. Like the energy the soda can had when it was moved from the ground to the table. There's mechanical energy when a hammer hits a nail, or broom sweeps the floor. There's also mechanical energy when a saw cuts a branch.

Wow, that fire is looking good. Is the fire too hot to roast marshmallows?

Yeah. It looks like if the fire gets any hotter the marshmallows will melt. We better not add any more fuel to this fire.

Fuel is what you put in the car. You need wood, don't you?

Well, wood is the fuel for this fire.

Oh, I see. I was thinking of gasoline.

That's a type of fuel, too. Because the gas is burned to make the car work.

Different Forms of Energy

Oh, I get it.

Now fuel doesn't always mean gasoline. Fuel is anything that is burned up to provide energy. The fuel for this fire is wood. The energy that fuels produce is called chemical energy. When chemicals act on each other the chemical energy inside them is set free. Chemical energy is the energy that comes from chemical changes. People also use chemical energy. You eat food, the food is turned into chemical energy, and you use that energy to walk, run, and lift things. Fireworks use chemical energy, too. There are special chemical powders in the fireworks and their energy is released when you add heat by lighting the fuse. The booms and bangs you hear are produced by chemical changes from fire and chemicals. And just like in your fire, chemical energy can come from wood.

You better move your glass of ice water away from the fire or it will melt.

Why?

Well, did you know that heat is a kind of energy, too?

Heat?

Yeah. Heat is one kind of energy coming from the fire.

Heat energy is also called thermal energy. Heat energy is the energy that moves tiny particles in matter. This is the type of energy that could melt ice if you leave your ice water too close to the fire. Heat energy can even make water boil. When water boils it makes steam. Steam can be used to make many things move, like the wheels of a locomotive. Everything is made of tiny particles called atoms which join together to make molecules. These molecules are vibrating all the time. When heat waves hit the molecules, the molecules move faster. As they bump into each other they spread apart. The reason why ice turns into water when you heat it is because ice is solid water. And when heat makes the molecules in the ice move faster and faster, the molecules spread out and the ice becomes liquid water. And if you keep heating the water, the molecules keep moving faster and faster and farther apart until it boils.

OK, I get how fire can heat things up like water. But how come when you stand further away you can still feel the heat?

You can still feel the heat because heat spreads out in all directions.

The sun gives off lots of heat energy. That's why it feels hot in the daytime, but cooler at night after the sun goes down. But the sun also gives off light and light is a form of energy, too. Just like heat, most of the light energy that we use comes from the sun. Light energy travels in waves and can move through millions of miles of empty space. The sun's light energy gives living things in the world the energy to do lots of different things. It is the starting point for most of the energy we use on Earth. If it weren't for the sun, people wouldn't have the energy to walk or run.

Different Forms of Energy

The sun gives us the energy to move around.

I don't understand. How does the sun give me energy to walk or run?

Well, it all starts with the process called photosynthesis.

That's right. When the sun shines on plants it starts a process called photosynthesis. That's a big word, but it describes how plants use energy from the sun's light to make their own food and to get energy they need to grow. The food that a plant makes is stored as sugar and starch in the parts of the plant. So leaves, fruit, stems, and roots all store energy that comes from the sun. When plants grow fruits or vegetables, people come along and sometimes eat them. Or we eat animals that have been feeding on vegetables and grains. Inside our bodies, much of the food we eat changes into energy and that's how you kids get the strength to run and jump around all day.

The sun can also provide lots of different types of energy, like solar energy. You've seen a solar calculator before, right?

Oh, those are the ones that don't need batteries. aren't they?

Right. They use light energy, called solar energy, to make the calculator work. The sunlight will shine on tiny panels and that would produce energy. The sunlight would be changed into electrical energy and that would make the calculator work.

So I know about mechanical energy, heat energy, light energy, and chemical energy. Are there any other kinds of energy?

Yes. Every day at our houses we use electrical energy.

Electricity can also be produced by water. First, the sun warms the water. Then, the water evaporates into the air and falls as rain or snow, filling rivers and lakes. The water can run big generators which create electrical energy. A generator has a loop of wire that turns inside a magnet. And as the loop of wire spins, an electrical current is produced. The electricity then flows through power lines and eventually ends up in our houses.

Nowadays, most of the appliances in people's houses use electrical energy to work. The TV, the washer, and dryer, the blender, and so on.

Do our flashlights use electrical energy?

Batteries in flashlights have stored chemical energy. When the chemicals react with each other they create an electrical charge. The charge is transformed into electrical energy when the flashlight turns on.

Whoa, did you hear that? By the way, did you know that sound is a kind of energy, too?

Different Forms of Energy

Sound? How is sound a kind of energy? Sound doesn't heat anything, or make anything move, or make anything work.

That's not necessarily true.

Sound waves can also be changed into electricity. Sound is the energy of vibrations carried by air, water, or other matter. Sound is produced when an object moves or vibrates. A good example of sound energy is, of course, the telephone. A telephone converts sound energy into electrical energy and then back into sound energy again. When you speak into the mouthpiece of the telephone, the phone's mouthpiece has a receiver that can change sound energy into electrical energy. Now on the other end of the phone conversation, in the earpiece, the electrical signals pass through a coil. This coil then converts the electrical energy back into sound energy, which is exactly like the sound created by the person speaking on the other end.

So can sound make other kinds of energy too?

Well, sound can't actually make other kinds of energy, but it can be transferred into other types of energy. You see, all kinds of energy can be transferred into other forms of energy.

I see. Like in a flashlight. The energy is transferred from the battery into light.
