

Putting Energy Transfers to Use

Many of the energy transfers that occur around us take place with the help of machines. Machines make it possible to control energy transfers so that they are useful for us. When machines transfer energy they make something useful happen—spinning our bicycle wheels, cutting our grass, cooking our food, and many other things.

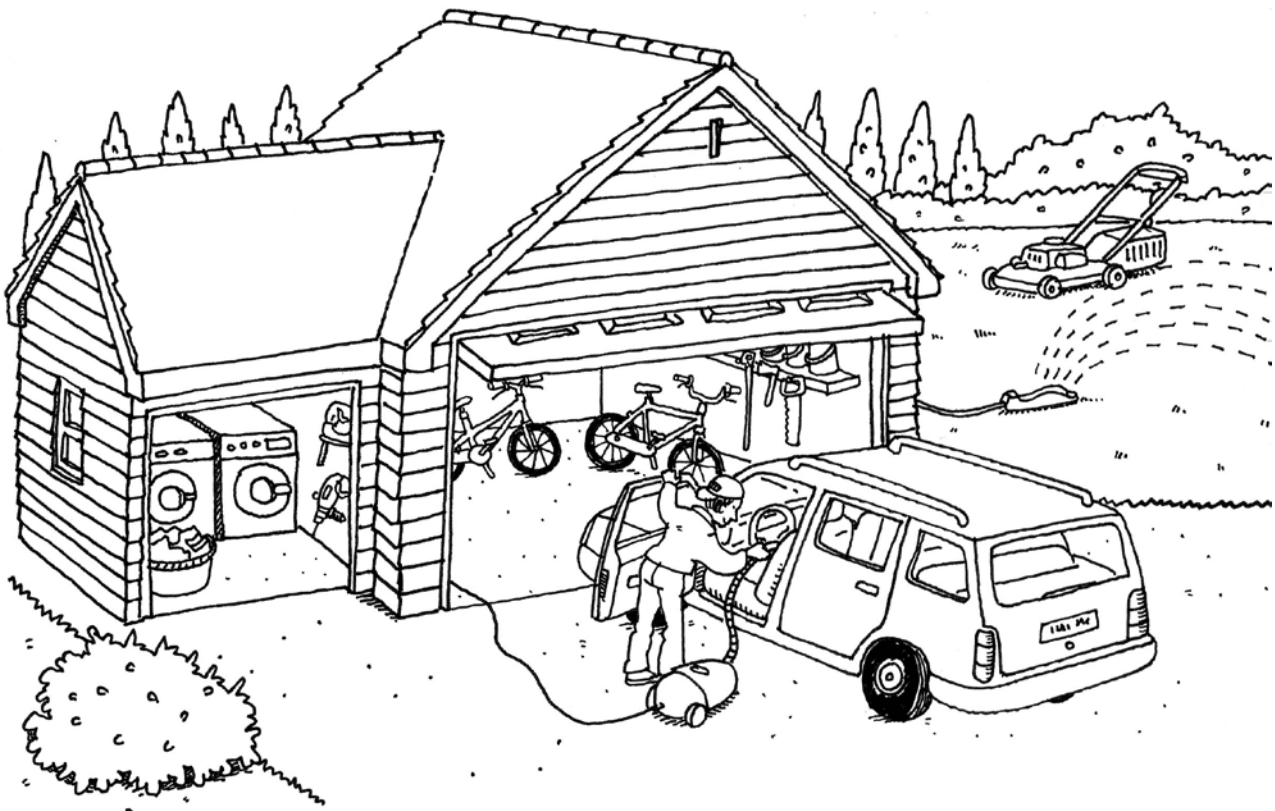
Machines and Energy Transfers

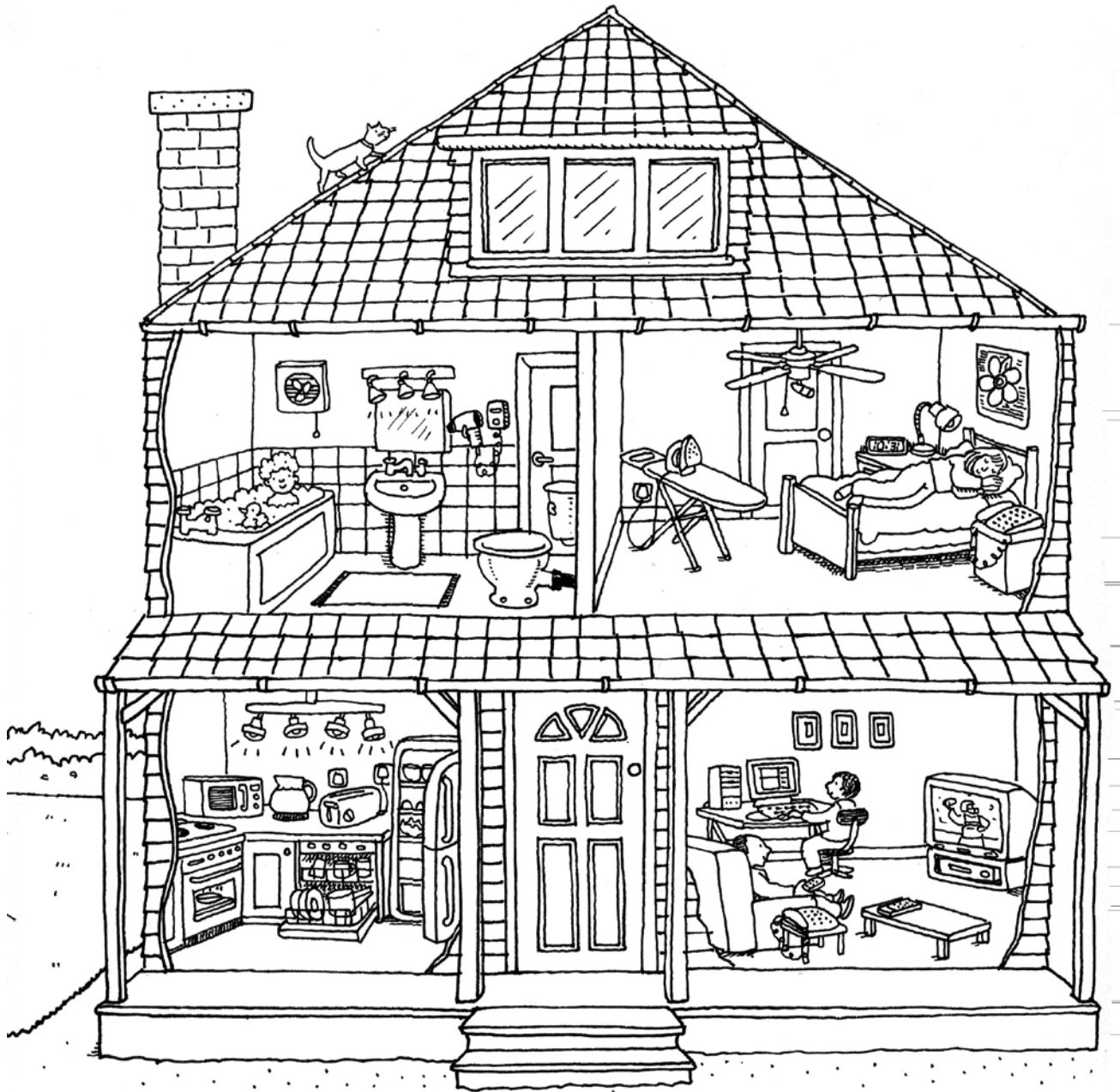


Think About It!

What machines do you depend on every day?

Machines make our lives easier. From the minute our alarm clock wakes us up in the morning to the time we turn off the lights at night, we depend on machines. Machines take in energy and transfer it—doing all sorts of work for people.





Energy Challenge

List all the machines you see in this home. Describe how each machine makes life easier and the energy transfers that occur as the machine performs its task. Organize your information in a table.

Floating Machines— Boats and Energy Transfers

Throughout history, boats have played an important role—carrying explorers to distant lands, protecting coastlines, and providing coastal communities with food and supplies.

Just like all machines, boats transfer energy to perform useful work. Boats do something very useful—they carry us and our things across water. And since over two thirds of Earth’s surface is covered by water, boats have been, and still are, one of our most important machines.

How Do Boats Transfer Energy to Carry People and Things Across Water?

That depends. Different boats use different energy transfers to move across water:



Sailboats work by capturing the wind in their sails. As the wind is caught, its motion energy is transferred to the motion energy of the boat, moving it across the water.



Rowboats, canoes, and kayaks rely on muscle power to propel them forward. The chemical energy in a paddler's or rower's muscles are used to move their arms. The motion energy of a person's arms is transferred to the oars and paddles, and eventually to the boat itself, moving it where the paddler or rower wants it to go.



Power boats work by burning fuel (gasoline or diesel). As the fuel is burned in the motor, the heat energy produced is usually transferred to the motion energy of a spinning propeller. As the propeller spins, it pushes the water backward, moving the boat forward.

Machines of Today and Yesterday

Many of the machines you depend on were not even around when your parents, grandparents, and great-grandparents were children. Take a minute to ask them about some of the everyday machines around you, such as computers, televisions, and cell phones.

- Did they have them, too? If so, what were they like then?
- If they didn't have these machines, how did they accomplish the same tasks? Did they do other things instead?
- What machines were considered "cool" or "cutting edge" when they were kids?

You might be surprised by their answers.



Household Chores in the 18th Century

The pictures below take you back in time to the 18th century. Read the description below each item to see how common household chores were carried out.



Fireplaces were used not only to heat homes, but also to bake bread and provide hot water for cooking and cleaning. The ashes were used to make soap.

Putting Energy Transfers to Use



Candles were an important source of light within an 18th century home. Candles were handmade using fat from animals that were butchered for food.



Wrinkles were removed from clothes using a heavy piece of iron with a handle and a flat underside that was heated in a fireplace. Now you know why it's called an "iron"!



People scrubbed dirty clothes in big wooden tubs against a wooden board with a rippled surface, known as a washboard.



After scrubbing, laundry was often hung outdoors on a clothesline to dry. (Laundry was also dried indoors by laying it over a wooden rack placed in front of a fireplace.)

Putting Energy Transfers to Use



Clocks and pocket watches were considered expensive items in the 18th century. In their place, many people used the falling sand of an hourglass or the path the sun's shadow took on a sundial to keep track of time.



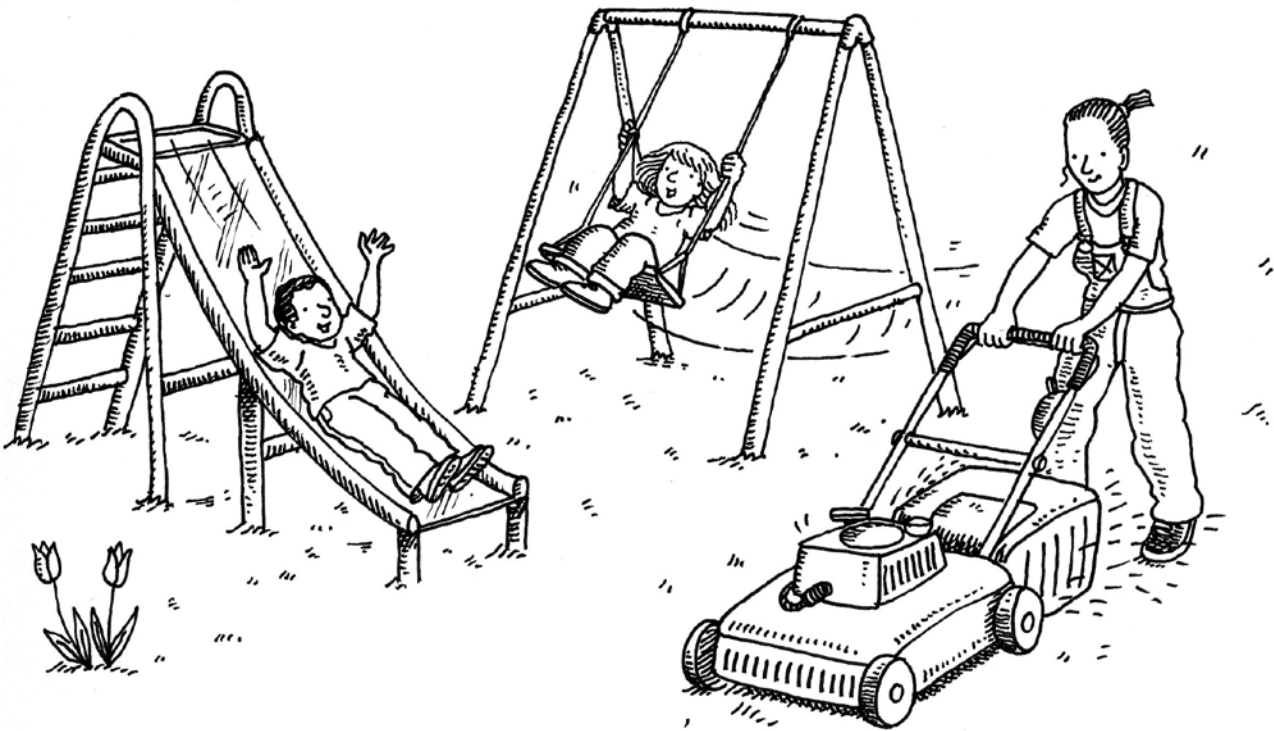
Special stone buildings were built over springs to keep foods such as milk cool. The naturally cool spring waters would flow around crocks of milk kept inside the building to keep the milk from spoiling.

Think About It!

What machines are used to carry out these same functions today? What are the benefits of using these machines over the earlier methods? Are there any disadvantages?

Testing Your Energy IQ

You have learned some of the ways energy is transferred—from within the earth, through the atmosphere, between living organisms, in machines. Now use what you know to test your “energy transfer” awareness. Study this park scene and see how many energy transfers you can identify.





Putting Energy Transfers to Use

Credits

Page 2: Anthony Lewis. **Page 3:** Anthony Lewis. **Page 4:** Photos.com.
Page 5: (top) Photos.com; (bottom) Photos.com. **Page 6:** (left) Photos.com;
(center) Photos.com; (right) Photos.com. **Page 7:** Photos.com.
Page 8: (top) Photos.com; (bottom) Photos.com. **Page 9:** (top) Photos.com;
(bottom) Photos.com. **Page 10:** (left) Photos.com; (right) Photos.com.
Page 11: Photos.com. **Page 12:** Anthony Lewis. **Page 13:** Anthony Lewis.

ScienceCompanion
CHICAGO SCIENCE GROUP
2015 Edition. Copyright ©
2015 Chicago Science Group.
All Rights Reserved.
www.sciencecompanion.com