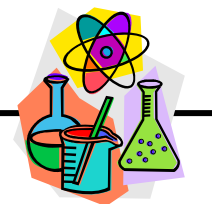


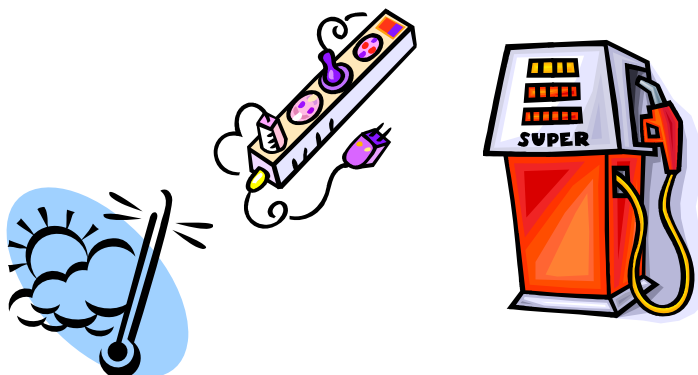
# Grade 9 Unit D: Electrical Principles and Technologies



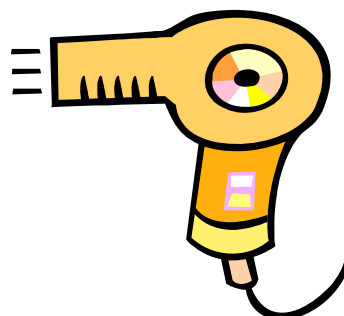
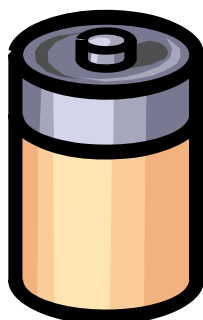
## Converting Energy

There are many different forms of energy, including:

- mechanical
- nuclear
- radiant (light)
- chemical
- thermal (heat)
- electrical
- wind
- water.



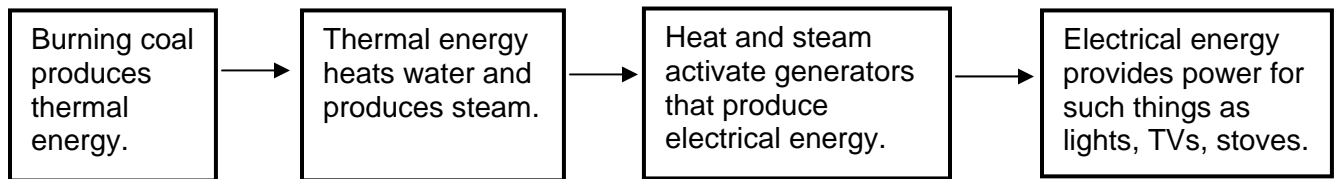
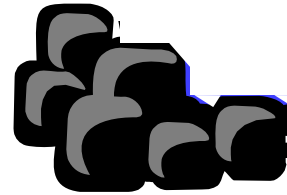
1. Individually or in a group, identify examples of each of the eight forms of energy listed above. Create a chart to record your information.
2. Identify appliances or other tools that use or produce energy at home, in school and at a variety of workplace settings. Classify them into one or more of the eight forms of energy. For example, batteries in a radio supply chemical energy; hair dryers use electrical energy and produce thermal energy.



**Energy conversion** The process of converting energy from one form to another. Often machines are used to convert energy from one form to another (e.g., engines, boilers, windmills). Energy is converted so that it can be used by other machines or to provide something we need, such as heat, light or motion.

Examples:

- Coal in power stations provides power for homes.



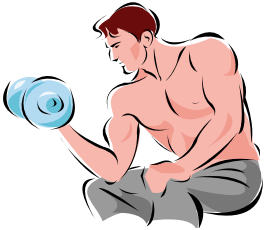
- Your body converts energy when you exercise. Chemical energy from the food you eat turns into mechanical energy that allows you to move the pedals on a bike or perform other activities.



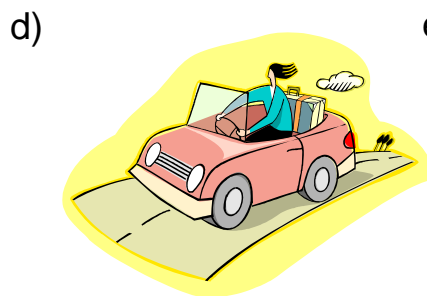
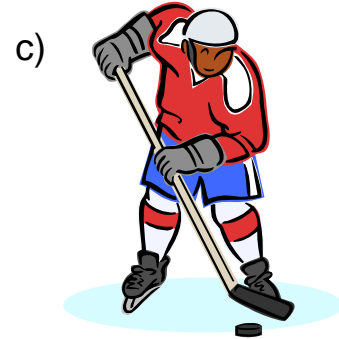
1. Hold a thermometer in your hand for 5–10 seconds. Record the temperature. Rub your hands together vigorously for 10–15 seconds. Take and record the temperature of your hand again. The temperature increased because you converted (changed) mechanical energy—rubbing your hands together—to thermal (heat) energy.

Explain other examples of energy conversions in the human body, such as chewing and digesting food.

2. Individually or in a group, plan and conduct the following experiment. Share your results with classmates. Before you begin, make sure you understand the process of [Scientific Inquiry](#).

<b>Question</b>
What is the effect of energy conversion on temperature?
<b>Hypothesis/prediction</b>
<hr/> <hr/>
<b>Materials</b>
<ul style="list-style-type: none"><li>• a heavy book, dumb-bell or other mass</li><li>• a thermometer</li></ul>
<b>Procedure</b>
<ol style="list-style-type: none"><li>1. Place the thermometer on the inside of your elbow and bend your arm.</li><li>2. Record the temperature after 15 seconds, then place the thermometer on a flat surface.</li><li>3. Pick up the book or dumb-bell and lift it up and down 10 times.</li><li>4. Record the temperature of the inside of your elbow.</li><li>5. Rest for 30 seconds, then repeat the lifting.</li><li>6. Take and record the temperature again.</li></ol>
<b>Diagram/sketch</b>
 An illustration of a muscular man with red hair, shirtless, sitting on the floor and lifting a blue dumbbell with his right arm. He is wearing grey pants.
<b>Results:</b> List below or on a separate page. Use a chart and/or graph to show your results.
<hr/> <hr/>
<b>Conclusion:</b> Compare findings with prediction and classmates' results. Write a conclusion and/or inference statement.
<ol style="list-style-type: none"><li>1. Discuss why the temperature changed.</li><li>2. Describe the energy conversions that took place.</li></ol> <hr/> <hr/>

3. Identify the energy conversions (or transformations) in each of the following graphics. Record your answers in a chart like the one below.



Example:	Energy source	Energy conversion
a. lawnmower	gasoline	chemical to mechanical— blade turning
person	fuel from food	chemical to mechanical— pushing the lawnmower

## Energy Storage

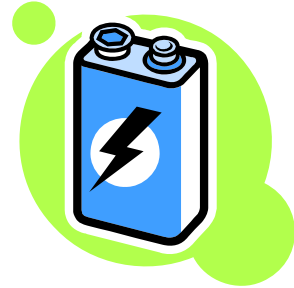
Energy can be stored using chemicals, for example in:

- **batteries** and
- **fuel cells.**

**Battery** A device that stores chemical energy and transforms it into electrical form.

**Fuel cell** An electrochemical (electrical and chemical) energy conversion device. It produces electricity from a fuel.

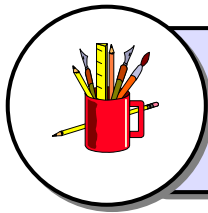
4. Investigate different types of batteries and how they work. Create a diagram that shows how a battery stores and transforms energy.



**Did You Know?**

Even if they were never taken out of the package, disposable batteries can lose two to twenty-five percent of their charge every year.

5. Investigate hydrogen fuel cells. Before beginning, record what you already know and any questions you have in a KWL chart. Use this information to guide your investigation.



Use Tool [KWL Chart](#).