A Supplementary Material in Science Grade V

Warm Radiance

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Overview

Electricity at home, in school, or in the office, and everywhere else provides convenience. In order for electrical energy to be useful, it has to be put to work to power some kind of device that does something for us. Nowadays, electrical devices are all around us. Most of them take electrical energy and transform it into other kinds of energy that we find more directly useful. Electrical energy often gets transformed into heat energy, light energy and mechanical energy.

This supplementary material will deal on the concept that electricity can produce heat and light. The activities provided are designed to enrich pupils' knowledge on electricity. Furthermore, it helps to create awareness among pupils the value of conserving electricity and its proper utilization.

I. Objectives

- Observe that electricity can produce heat and light
- Infer how electricity can produce heat and light
- Cite ways to conserve electricity when using light and heating devices

II. Subject Matter

Topic: Heat and Light from Electricity

References:

- Science Spectrum 5, Rebecca R. Fallaria, et.al., page 197
- Cyber Science 5, Nicetas G. Valencia, et.al., pages 240-243
- Science and Health for a Changing Environment 5, Estrellita S. dela Cruz, et.al., pages 170-171
- www.thetech.org/exhibits/online/topics
- PELC V. 4.1

Materials: electric flat iron
lamp shade
glue gun
manila paper
markers

Duration: 60 minutes

Value Infused: Conservation of Electricity

III. Procedure

A. Motivation

Show pictures of electrical home devices.

Ask the following questions.

- Which of these devices do you have at home?
- When do we usually use them?

B. Activity

- Preliminary Activity
  Before giving the activity sheet to the class, please observe the following:
  - Divide the class into 6 groups.
  - Provide necessary safety measures when needed in doing the activity.
  - Set standards to be observed aside from the precautions including time allotment in hands-on activities and manner of reporting.
  - Provide wait time if necessary.
  - Mill around while the class is performing the activity.

- Activity Proper
  Refer to activity sheet.

C. Analysis

Ask the following questions after processing the outputs.

- What kind of energy is needed to make the devices function? *(electrical energy)*
- Describe what happened to the devices when they were turned on? *(The flat iron and glue gun heated up. The lamp shade lighted.)*
- What made the electric flat iron and glue gun heat up? *(the switching on of the devices allowing electricity to flow)*
- What made the lamp shade light up? *(the switching on of the lamp shade allowing electricity to flow)*
- What kind of energy was produced when the electric devices were turned on? *(heat energy and light energy)*
- How is heat and light produced?

Teaching Hint: *The teacher may give additional input on how electricity is transformed to heat and light. (Refer to the Background Information for Teachers)*

- In what way is electrical energy helpful to us? (varied answers)

D. Abstraction

What can you say then about electricity?
Based on all your observations in our activities, what inference can you give about utilization of electrical energy?
Into what forms of energy can electricity be changed into?
(*Switching on some electrical devices can change electrical energy to heat and light. Heat energy is also produced as a by-product when using electricity.)*

E. Application

Read this situation to the class. Let them explain their answer briefly.

Six chicks were hatched from eggs. A lighted bulb was placed in their coop. Why is this so?
(The lighted bulb provides security and artificial heat for the chicks to keep them warm and help them in their growth.)

All of these appliances need electricity when used.
What should we remember when using these devices?
How can we help conserve electricity when ironing the clothes? When using electric lamps or lights?

How can we help conserve electricity when ironing clothes?

- ❖ *In dampening clothes to be ironed, apply proper amount of water.*
- ❖ *Have a regular schedule for ironing clothes. Avoid ironing clothes one piece at a time.*
- ❖ *When you are almost through ironing a pile of clothes, unplug the iron. There will be enough stored heat to press the few remaining items.*

How can we help conserve electricity when using lights?

- ❖ *Clean bulbs regularly.*
- ❖ *Turn off lights when not in use.*
- ❖ *Use natural light whenever possible.*
- ❖ *Use fluorescent lamps instead of incandescent bulbs.*
- ❖ *Avoid frequent switching on and off of lights.*

- Why should we conserve electricity? (Answers may vary.)

IV. Assessment

Directions: Read the items carefully. Choose the letter of the correct answer.

1. What form of energy does a glue gun produce when turned on?
   A. heat
   B. light
   C. wind
   D. motion

2. What energy change takes place when you switch on a lamp shade?
   A. electrical to heat
   B. electrical to light
   C. electrical to chemical
   D. electrical to mechanical

3. Which of the following devices produces both heat and light?
   A. hair iron
   B. floor polisher
   C. electric stove
   D. electric fan

4. Why is electricity used by people? It _____.
   A. is expensive
   B. can be easily used
   C. is available anywhere
   D. can be changed into other forms

5. Which of the of the following practices show conservation of electricity?
   A. Iron clothes every day.
   B. Use incandescent bulbs.
   C. Keep lights on when sleeping.
   D. Turn off lights when not in use.

V. Assignment

Go into different parts of your house and make a list of different appliances that use electricity. Find about 5 items. Write them down in a column like this:

Appliance	Form of Energy Produced
Ex: glue gun	*heat*
1.	
2.	
3.	
4.	
5.	

VI. Resource List

This learning material contains:

- Teacher's Guide with Answer Key
- Activity Sheet
- Pictures of Electric Devices
- Background Information for the Teacher

ANSWER KEY

1. A
2. B
3. C
4. D
5. D

Activity 1

WARMING UP!

Time Allotment : 10 minutes
Materials : electric flat iron
glue gun
extension wire

Procedure :

1. Touch the electric flat iron and glue gun.
    - How do they feel?
2. Plug the devices in the extension wire and turn on the switch.
   After waiting a while, touch quickly the side of the flat iron and the metal tip of the glue gun.
    - How do they feel now?
    - What kind of energy do they produce?
    - What made them heat up?
    - What energy is flowing through the wire and to the devices?
    - How is heat produced?

Activity 2

TOUCHING AND SEEING

Time Allotment : 10 minutes
Materials : lamp shade
extension wire

Procedure :

1. Observe the lamp shade.
    - How does it look?
2. Plug it in the extension wire and turn on the switch.
    - How does it look now?
    - What kind of energy does it produce?
    - What made it light up?
    - What energy is flowing through the wire and to the device?
    - What happened to the electrical energy upon reaching the electric device?
    - How is light produced?
3. Quickly touch the bulb of the lamp shade.
    - How does it feel?
    - What makes it heat up?

BACKGROUND INFORMATION FOR THE TEACHER

Electricity comes from the movement of electrons. Electrons are tiny particles that orbit the nucleus of an atom. When enough electrical energy is added to the electrons – after flipping on a switch, or plugging in a cord, or adding a battery – they can escape from their normal orbit and flow along a path.

That's mostly how people use electricity…we make it flow along a path into things like light bulbs, refrigerators and CD players. The path electrons follow is called a circuit.

Electrons moving along a path create an electrical current. So what if electricity is flowing? What can we use it for? Plenty! But something has to happen to electricity first.

In order for electrical energy to be useful, it has to be put to work to power some kind of device that does something for us. Nowadays electrical devices are all around us. Most of them take electrical energy and transform it into other kinds of energy that we find more directly useful. Electrical energy often gets transformed into heat energy, light energy and motion energy.

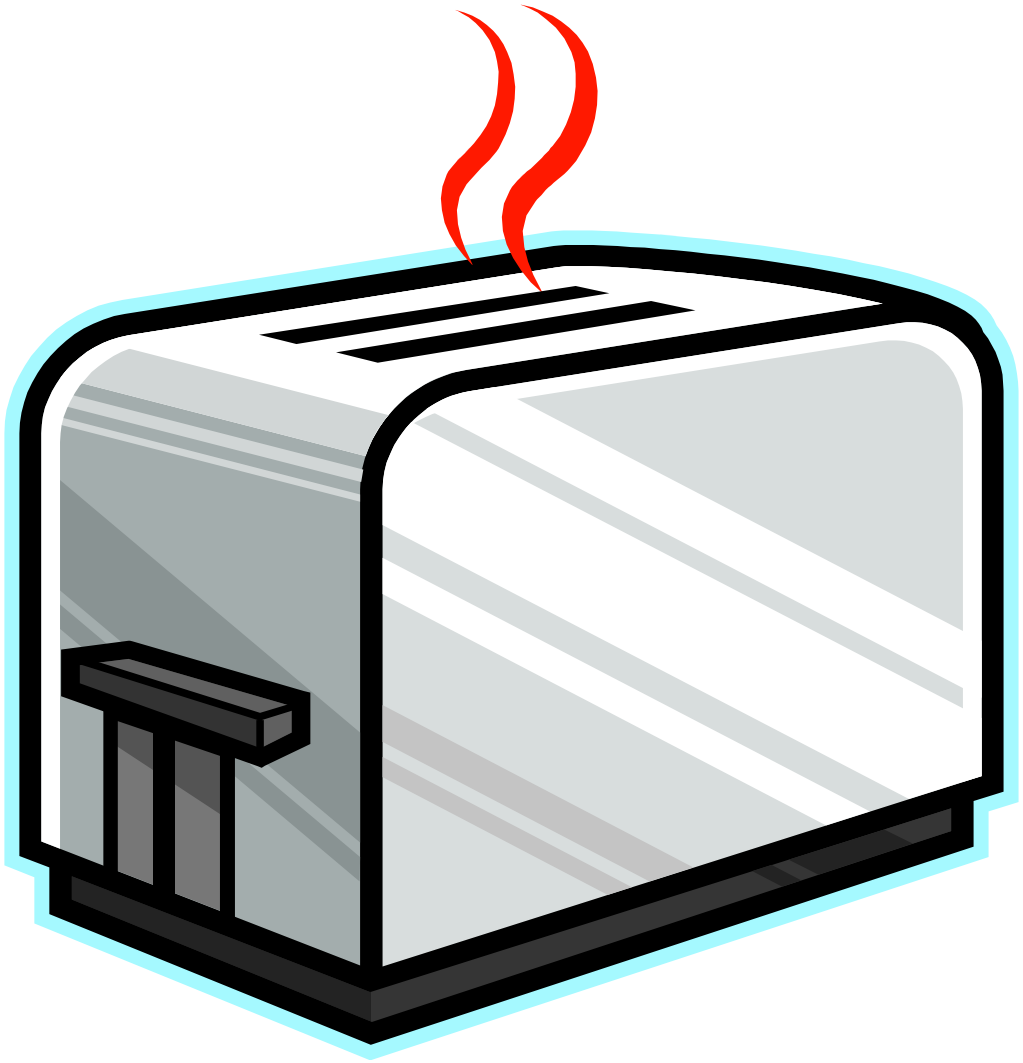
Electrons in copper wire have an easy time breaking free from the pull of their atoms, therefore copper is said to have "low resistance." The easier it is for electrons to break free, the better electricity flows, and the lower resistance a material has.

But materials with high resistance usually have fewer electrons available to break away, and often the atoms are closer together. This means a stronger pull on each electron, which makes them slow down. Because the electrons keep fighting to escape, the atoms shake back and forth and heat up. In light bulbs, we see the glow from that heat as light.

What about the electric stove? That's basically the same thing. If you look into an electric stove you can see wires that glow orange or red. These are like the filament in a light bulb. Those wires inside the stove are also made up of a material with a high resistance, so electrons slow down and vibrate with the atoms to produce heat . . . cooking your food.*(www.thetech.org)*

Source: themercurymonster.wordpress.com

Picture 1



Source: Microsoft Clip-Art

Picture 2

Source: light-bulbs.us

Picture 3

Source: Microsoft Clip-Art

Picture 4

Source: lazerindia.com

Picture 5

Source: delihardw.en.ec21.com

Picture 6

Source: bajajeshop.com

Picture 7

Source: 24electricstove.10ha.net

Picture 8

Source: forums.xbox-scene.com

Picture 9

Source: french-furniture.eu

Picture 10