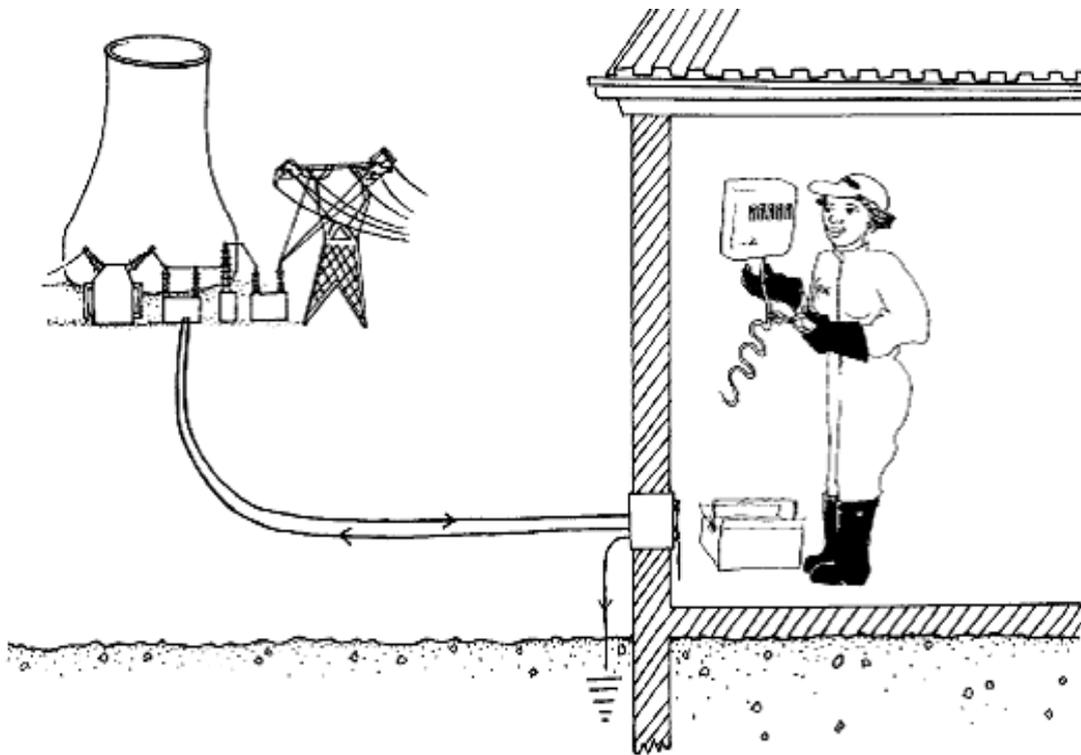


Grade 5

ENERGY AND CHANGE

TRIMESTER - 2



Grade 5 Science Teacher: Khalid Elawad

Sources /

WESTERN CAPE PRIMARY SCIENCE PROGRAMME

www.eia.gov/kids/energy.cfm?page=solar_home-basics



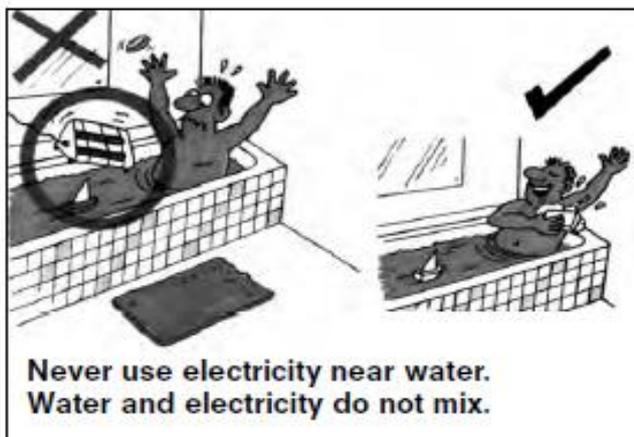
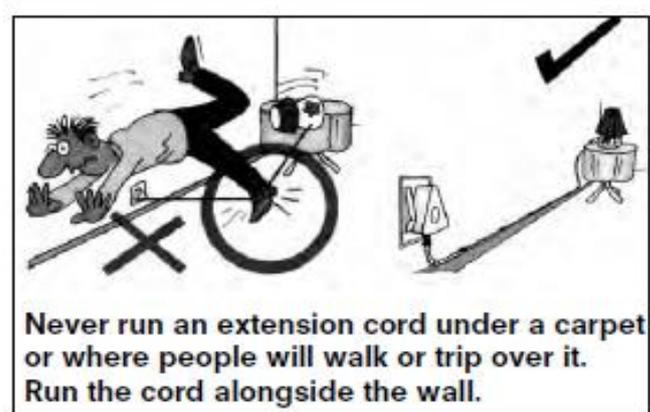
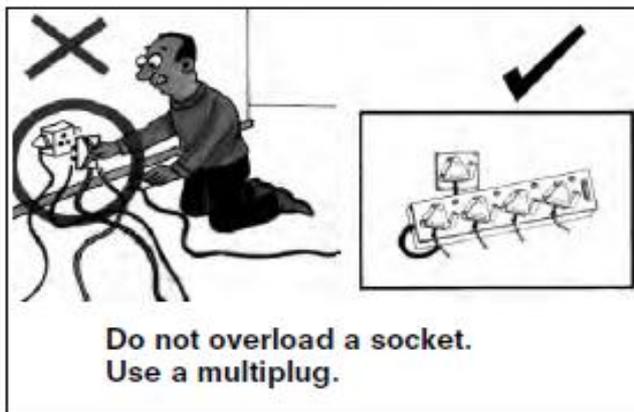
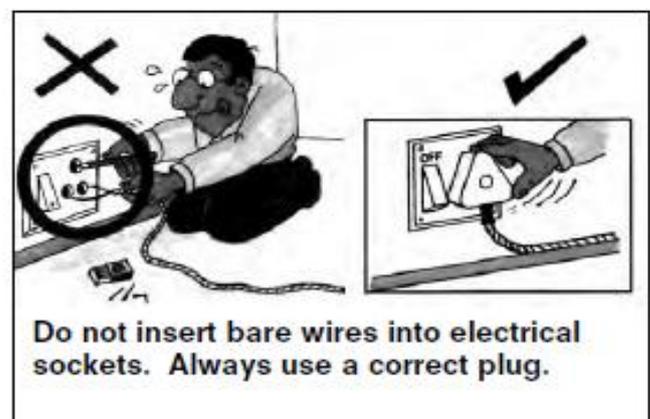
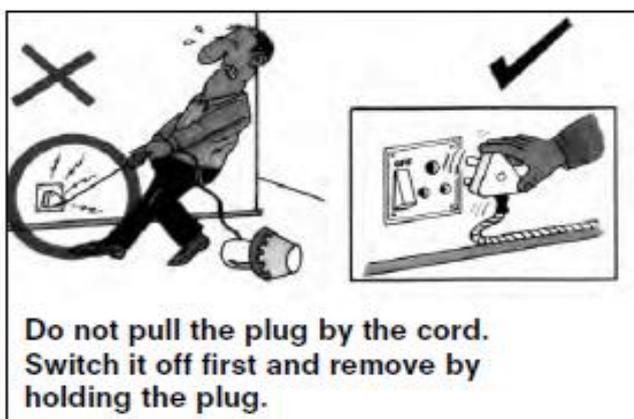
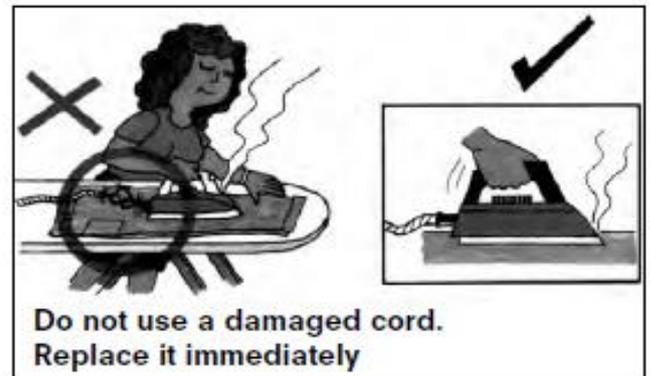
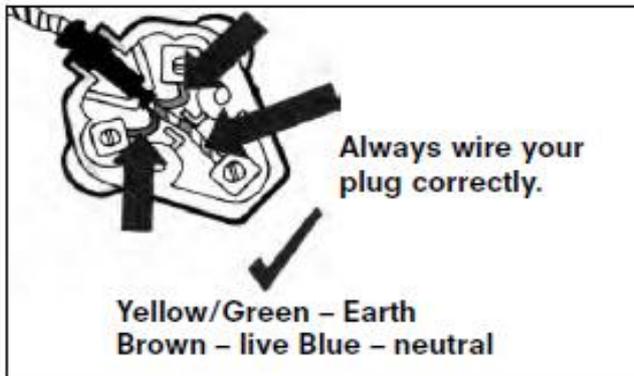
Contents:

Page	Activity	Lesson
3	Activity 1	Rules for using electricity safely at home.
5	Activity 2	Electrical energy travels through different materials.
7	Activity 3	Making electric circuits in order to get heat, light, sound and movement energy
8	Activity 4	We also get heat, light, and sound and movement energy from the main supply.
9	Activity 5	How much electrical energy do appliances use from the main supply?
11	Activity 6	Where does the main electricity come from?
12	Activity 7	Using Solar Energy Experiments

Activity 1

SAFETY IN THE HOME

Be safe and happy with electricity by observing these simple rules.



Learner task

Rules for using electricity safely at home

(continued)

When I want to use electricity safely I must:

1. Make sure that my hands are dry before I touch any electrical plugs.

2. -----

3. -----

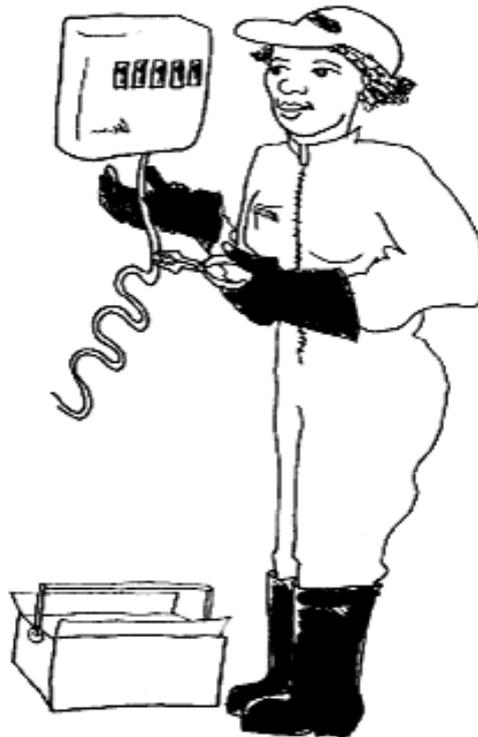
4. -----

5. -----

6. -----

7. -----

4. Finally draw a picture of an electrician working. Remember everything you have learned about using electricity safely.



TASK CARDS

Photocopy for learners

Activity 2

Which materials can electricity flow through?

A

1. Use the apparatus to make the light bulb light up.
2. Draw a diagram to show how you made the light bulb light up.

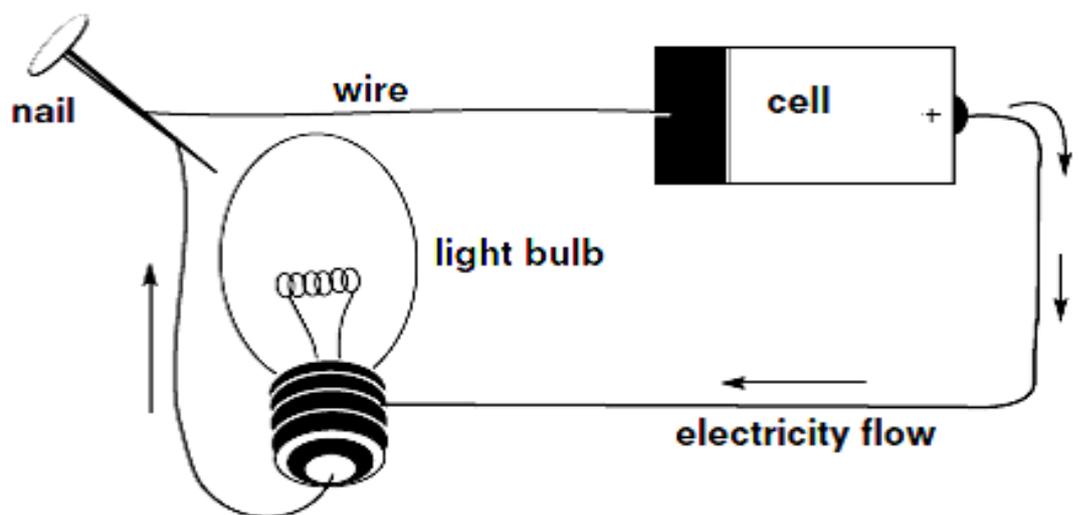
DIAGRAM

3. Why did the bulb light up?

.....

B

1. Now make a circuit like this.



2. Does the light bulb light up?

.....

3. Did electricity flow through the circuit?

.....

4. Does the nail conduct electricity?

.....

5. Now test some more things to see if they let the electricity flow through.

Record your results on the table:

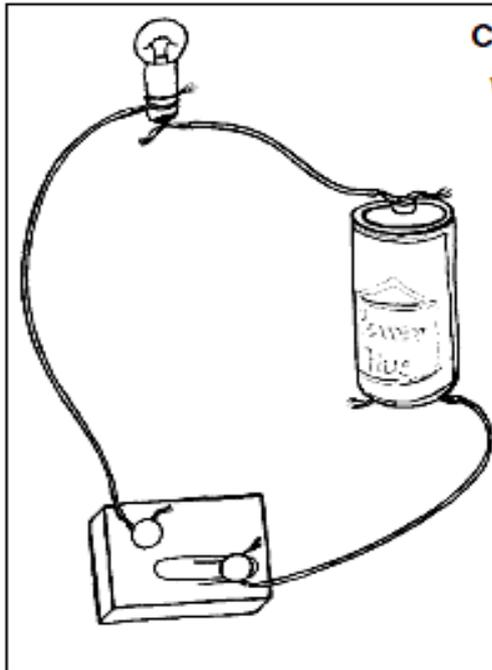
Materials for testing	Does the bulb light up? Yes/no	Did the material let the electricity through? Yes/no	Is the material an insulator or a conductor?
nail			
paper clip (metal)			
metal coin			
wooden clothes peg			
plastic bottle top			
metal wire			
metal spoon			
plastic spoon			
a piece of glass			
a plastic button			

Task card

Activity 3

Making electric circuits to get heat, light, sound and movement energy

1. Make three different electric circuits. Explain what happens when you close the switch.

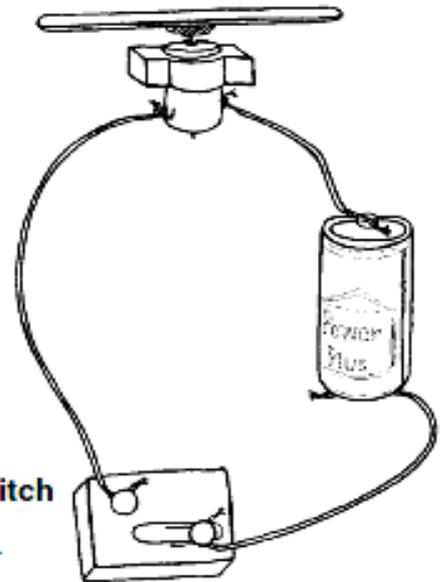


CIRCUIT 1

When I closed the switch

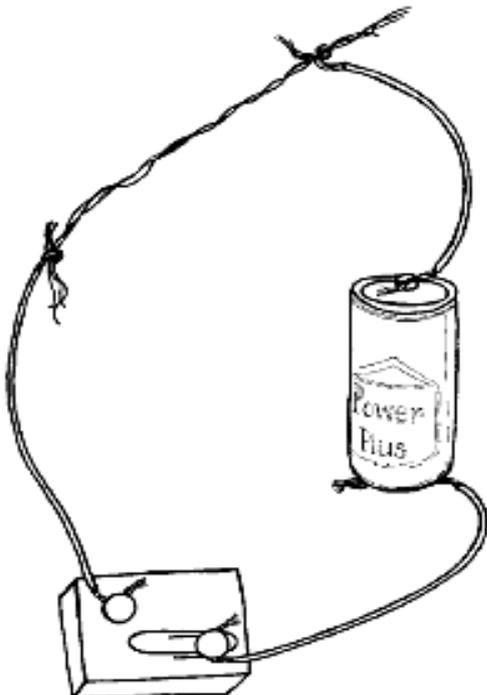
.....
.....

CIRCUIT 2



When I closed the switch

.....
.....
.....



CIRCUIT 3

When I closed the switch

.....
.....
.....

Task card

Activity 4

Light, sound, movement and heat energy

1. Plug in some electrical appliances and switch them on.
2. Record what happens:

Name of appliances	What happens when I switch it on?	What types of energy do we get from it?
Kettle		
Hair dryer (or heater)		
Food mixer (or fan)		
Radio		
Lamp		

Task card

Activity 5

How much electrical energy do appliances use from the main supply?

1. Place your picture on the class chart to show what energy you get from your appliance and how much electricity it uses. Use the table on the opposite page to help you.
2. Look at the completed class chart and then answer these questions:
 - ▷ Which appliance uses the most energy?
 - ▷ Which appliance uses the least energy?
3. Look at your chart again. Complete these sentences. Fill in the missing words.

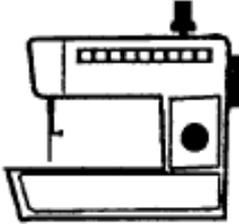
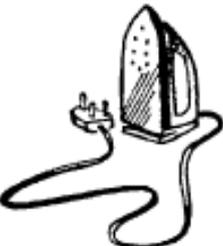
heat

light

sound

movement

- a. Appliances use a lot of energy when they give us _____
from electricity.
- b. Appliances use a little energy when they give us _____
from electricity.

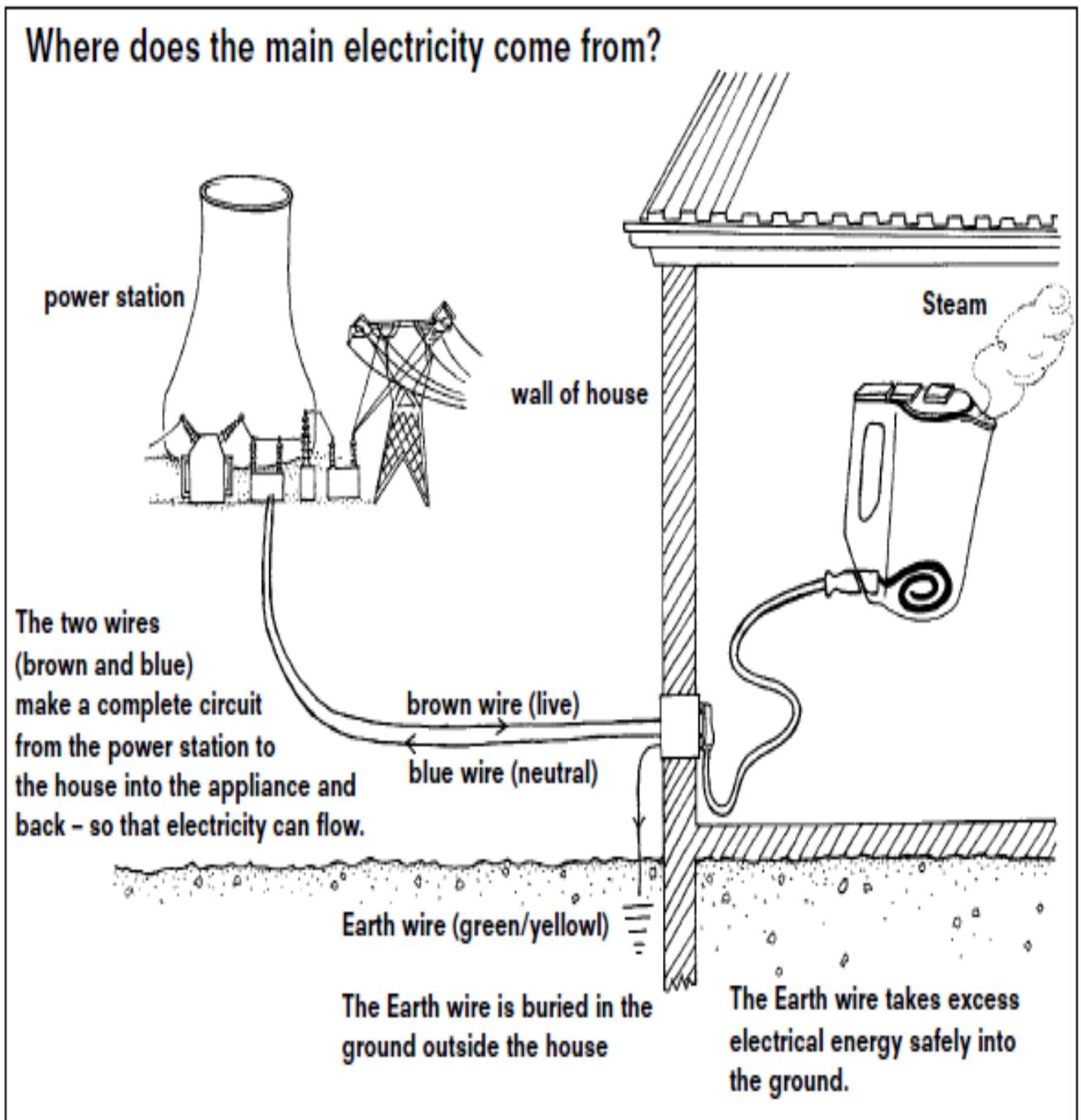
	APPLIANCE	Amount of electrical energy it uses in watts
	cell phone	3 W
	radio/tape/CD player	15 W
	fluorescent light	40 W
	table lamp	60 W
	sewing machine	75 W
	fridge	150 W
	fax machine	170 W
	microwave oven	230 W
	colour TV	340 W
	electric drill	360 W
	hair dryer	450 W
	washing machine	500 W
	vacuum cleaner	700 W
	iron	720 W
	toaster	1000 W
	electric frying pan	2000 W
	kettle	3000 W
	heater	3000 W
	hot water cylinder	4000 W
	stove	8000 W

Activity 6

Where does the main electricity come from?

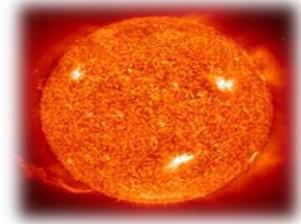
KEY CONCEPTS

- Main electricity is generated (produced) by power stations
- The electricity travels in wires from the power station to our homes and schools
- When we want to use the electricity from the main supply we have to connect the appliance by means of a 3-pin plug into the socket in the wall and switch on the electricity
- The 3-pin plug has three wires: the brown and blue wires connect to the main circuit, the yellow and green wire goes into the Earth and safely discharges dangerous electricity



Solar Energy from the Sun

The sun has produced energy for billions of years. Solar energy is the sun's rays (solar radiation) that reach the Earth. This energy can be converted into other forms of energy, such as heat and electricity.



Radiant energy from the sun has powered life on Earth for many millions of years.

In the 1830s, the British astronomer John Herschel famously used a solar thermal collector box (a device that absorbs sunlight to collect heat) to cook food during an expedition to Africa. Today, people use the sun's energy for lots of things.

Solar Energy Can Be Used for Heat and Electricity

When converted to thermal (or heat) energy, solar energy can be used to:

1. **Heat water** — for use in homes, buildings, or swimming pools
2. **Heat spaces** — inside homes, greenhouses, and other buildings
3. **Heat fluids** — to high temperatures to operate a turbine to generate electricity

A Solar Dish



Solar energy can be converted to electricity in two ways:

1. Photovoltaic or "solar cells"

Change sunlight directly into electricity. Individual PV cells are grouped into panels and arrays of panels that can be used in a wide range of applications ranging from single small cells that charge calculator and watch batteries, to systems that power single homes, to large power plants covering many acres.

2. Solar Thermal/Electric Power Plants

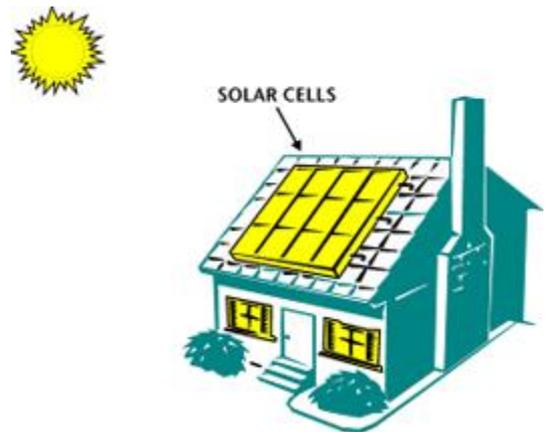
Generate electricity by concentrating solar energy to heat a fluid and produce steam that is used to power a generator.

The main benefits of solar energy are:

1. Solar energy systems do not produce air pollutants or carbon-dioxide
2. When located on buildings, they have minimal impact on the environment.

Solar Thermal Collectors

- Heating With the Sun's Energy
- Solar thermal (heat) energy is often used for heating water used in homes and swimming pools and for heating the insides of buildings ("space heating").
- The sun's rays heat up the inside of your car.
- In buildings, the air is circulated past a solar heat surface and through the building by convection (meaning that less dense warm air tends to rise while denser cool air moves downward).



Different methods for using solar energy

Experiment # 1

Make a Rainbow اصنع قوس المطر

Make a rainbow with just a few things from around the house!
اصنع قوس المطر من أشياء بسيطة في المنزل

Here's what you Need: الأدوات

- A sunny day يوم مشمس
- White piece of paper ورقة بيضاء
- A glass of water كوب زجاجي مملئ بالماء

Instructions: التعليمات

1. Find a sunny spot in the house near a window.
جد منطقة مشمسة بجانب احد النوافذ
2. Carefully carry the glass of water and white paper to your sunny spot.
احمل برفق كوب الماء والورقة وضعهما في المنطقة المشمسة
3. Hold the glass of water above the paper.
احمل كوب الماء فوق الورقة البيضاء
4. Watch as light passes through the glass of water and forms a rainbow on your paper!
لاحظ ماذا يحدث؟ سيتكون قوس المطر على الورقة البيضاء!



Experiment # 2

Light or Dark?

It's best to wear light colors on hot, sunny days. Why?

Experiment with colored cardstock, heat and ice to find out!

من الافضل عادةً ان ترتدي ملابس ذات الوان فاتحة في الجو المشمس الحار. لماذا؟
اجري هذه التجربة عن طريق حرارة الشمس والثلج والورق الملون لمعرفة الأسباب.

Here's what you Need: الادوات

- A sunny day يوم مشمس
- 1 piece of black heavy cardstock قطعة من الورق المقوى بلون اسود
- 1 piece of white heavy cardstock قطعة من الورق المقوى بلون ابيض
- 2 ice cubes مكعبا ثلج

Instructions: الخطوات

1. Take all of your materials to a sunny spot outside.
خذ كل الماد السابقة إلى مكان مشمس
2. Place each piece of cardstock on a flat surface.
ضع قطعاً الورق الملونتين في مكان مسطح
3. Put an ice cube on each piece of paper.
ضع مكعب ثلج على كل ورقة
4. Watch and see which ice cube melts the fastest.
لاحظ اي من مكعبي الثلج يذوب اولاً

Explanation: الشرح

- Why did the ice on the black paper melt first? Light surfaces reflect more light and stay cooler.
- Dark surfaces, on the other hand, absorb more light and collect heat.
- More heat from the black paper made the ice melted faster.
- اللون الابيض **يعكس** معظم طاقة الضوء (الحرارية) التي تصل إليه من الشمس ويبقى بارداً.
- اللون الاسود **يمتص (يجمع)** معظم طاقة الضوء (الحرارية) التي تصل إليه من الشمس و يحتر بسرعة.
- لذلك مكعب الثلج الذي على الورق السوداء يذوب أسرع من مكعب الثلج الذي على الورقة البيضاء.