2017-18 Student Guidebook
Energy Workshops

Name

_____

School

_____

Energy Sources Boards

Use the Energy Source Boards to connect the box on the right with the box on the left that finishes the sentence correctly. Draw a line to connect the correct boxes.

Biomass

Biomass is	in a process called photosynthesis.
The major uses of biomass are	any organic matter (anything that was once alive) that can be used as an energy source.
Biomass gets its energy from the sun. Plants absorb sunlight	biofuels, crops, garbage and landfill gas.
Burning biomass can	electricity, transportation and heating.
Most biomass energy comes from wood. Other biomass sources include	cause air pollution.

Coal

Coal, a fossil fuel, was formed millions of years ago when	surface mining and underground mining.
Coal companies use two methods to mine coal:	trains and barges.
Most of the coal mined today is used	plants died and were covered with layers of soil and rock.
Coal is transported by	to generate electricity.
A disadvantage of burning coal is it	causes air pollution.

Geothermal

Geothermal plants generate almost no emissions	in an area called the "Ring of Fire."
Some of the visible features of geothermal energy are	heating and producing electricity.
Most geothermal activity occurs around the Pacific Ocean	because they do not burn fuel to generate electricity.
Geothermal energy comes from heat within the	volcanoes, hot springs, and geysers.
People around the world use geothermal energy for	earth's core.

Hydropower

Hydropower is a renewable energy source because	which may change the habitat and disrupt wildlife and fish.
Some hydropower plants need to build a dam and reservoir	Niagara Falls.
Hydropower is the cheapest way	to generate electricity in the United States.
The first hydroelectric power plant was built in 1879 at	electricity.
Moving water turns a turbine to generate	it is replenished by snow and rainfall.

Energy Sources Boards

Natural Gas

The main ingredient in natural gas, which is colorless and odorless, is	methane.
Natural gas is transported by	cleanest burning fossil fuel.
Mercaptan, which smells like rotten eggs,	pipelines.
Natural gas is the	generating electricity, heating and transportation.
Natural gas is used for	is added for safety so you can identify a gas leak.

Petroleum

Petroleum is also called	crude oil or oil.
A refinery is a factory that processes	are other useful products made from petroleum.
The major use of petroleum is	may cause water and air pollution.
Plastics, fabrics and fertilizers	transportation.
The use of petroleum products	petroleum into products we can use like gasoline.

Propane

Under normal conditions, propane is a gas. Under pressure,	pressurized tanks.
In its natural state, propane is	it is portable, so it can be used in rural areas.
Propane is transported and stored in	heating, cooking and water heaters.
An advantage of propane is	colorless and odorless.
Homes use propane for	propane becomes a liquid.

Solar

Advantage of solar energy are	it is free, clean and renewable.
A photovoltaic (solar) cell	light, heat and electricity.
People use solar energy for	in the form of radiant energy.
A disadvantage of solar energy is	that it is not available all hours of the day.
Sunlight travels to the earth	absorbs sunlight and transforms it into electrical energy.

Energy Sources Boards

Nuclear

In nuclear fission,	is the fuel most widely used for nuclear fission.
Nuclear power plants produce no air pollution,	used for generating electricity.
Uranium 235	nucleus (core) of the atom.
Nuclear energy is energy in the	atoms are split apart releasing energy.
Nuclear fission was first used in World War 2. Today, it is	but their waste is highly radioactive.

Wind

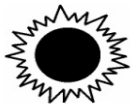
The major use of wind is	to generate electricity.
A wind turbine	because it does not burn fuel and cause air pollution.
A wind farm is	the uneven heating of the earth's surface.
Wind is produced by	transforms mechanical energy into electrical energy.
Wind energy is clean and renewable	a cluster of wind turbines used to generate electricity.

Renewable energy sources are replenished in a short period of time.

Wind is energy from moving air.

Geothermal energy is heat from within the earth.

Hydropower is energy that comes from the force of moving water.



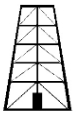
Solar energy is energy from the sun.

Biomass is any organic matter (anything that was once alive) that can be used as an energy source such as wood, crops, and yard waste.

Nonrenewable energy sources are limited since it takes a very long time to replenish

Coal is a solid, black fossil fuel formed from the remains of plants that lived and died millions of years ago.

Natural gas is a colorless, odorless fossil fuel made mostly of methane.



Petroleum is a fossil fuel that looks like a black liquid. It is also known as crude oil.

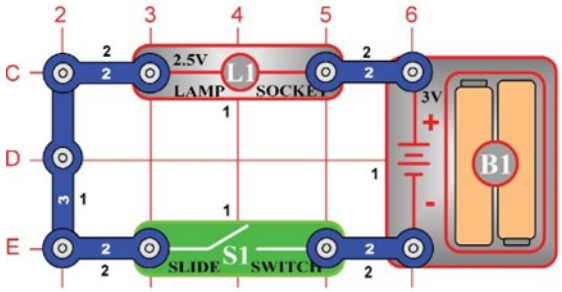
Propane is a fossil fuel refined from natural gas and petroleum.

Uranium is the fuel used by most nuclear power plants. During nuclear fission, atoms are split apart to form smaller atoms, which releases energy.

Snap Circuits

For each project, circle the correct answer or answers.

Build Project 1:

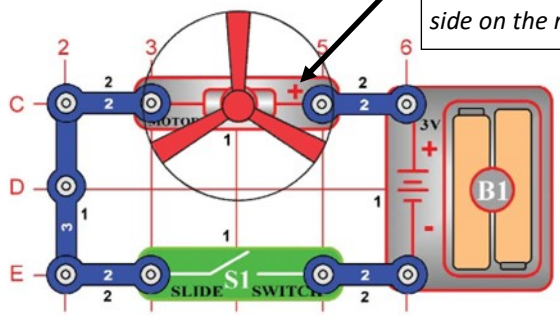


When the circuit is closed, the light is:

ON **OFF**

Build Project 2:

Note the position of the motor with the + side on the right.

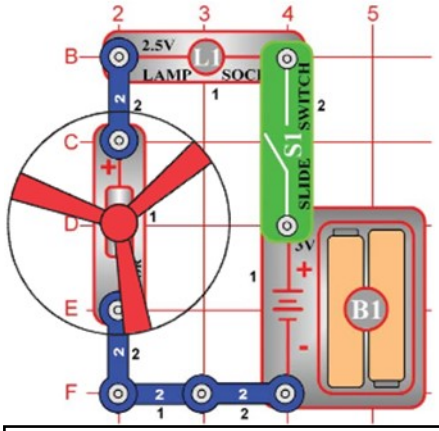


Circle all the forms of energy in this circuit:

Chemical **Electrical** **Mechanical**

Nuclear **Radiant** **Thermal**

Build Project 5:

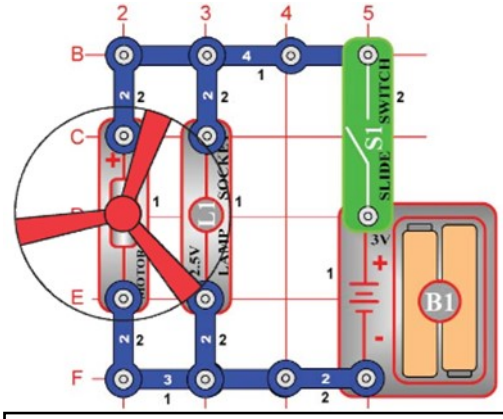


In a series circuit the electrical components are on a single path.

How does the light appear?

BRIGHTER **DIMMER**

Build Project 6:



In a parallel circuit the electrical components are on more than one path.

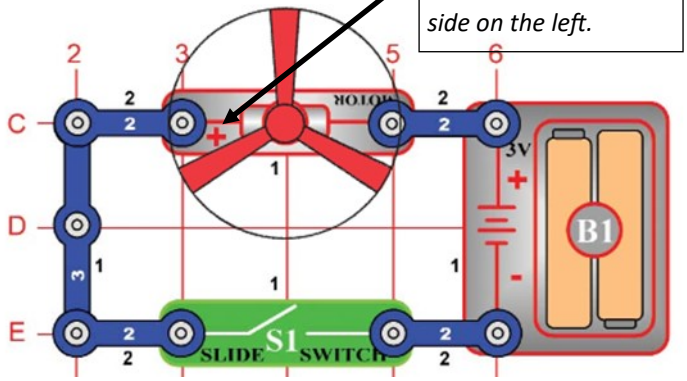
Trace the possible paths with your finger.

How many possible paths for electricity are there?

ONE **TWO** **THREE**

Build Project 11:

Note the position of the motor with the + side on the left.



Describe what happens with this circuit:

Energy Explorations

Sound Waves

1. What two things are necessary for a sound to be made?
   -
   -
2. Sound vibrations travel best through _____ materials.

Sound Pitch

1. The frequency of a sound wave is called its _____.
2. As a string or air column gets shorter, its pitch becomes _____.

Watts Up

Appliance	Watt Meter Reading (watts)	Rank #1-lowest watts #8-highest watts
Incandescent Bulb		
Hairdryer		
LED Christmas Lights		
CFL Bulb		
Radio (low volume)		
Incandescent Christmas Lights		
LED Bulb		
Fan		

Thermal Energy

1. Thermal energy (heat) always flows from _____ to _____ until equal.
2. Name one good insulator for your home:

Energy Forms

1. Which form of energy is a girl riding her bike _____?
2. Which form of energy is the light from the sun? _____

Energy Explorations

Thermal Camera

1. A thermal image is a record of the amount of _____ energy an object emits or reflects.

Balanced Forces

1. A _____ is a push or pull in a direction.

2. When forces are _____, there is no motion or change in speed or direction.

Light Refraction

1. The bending of light as it passes from one medium into another is called _____.

2. A _____ lens is the most useful type of lens and is found in many optical devices.

Light Reflection

1. Light bouncing off a surface is called _____ _____.

2. Light travels in _____ lines.

Forces & Motion

1. The motion of an object depends on _____ & _____.

2. What force pulls all things toward earth? _____

ELECTRICITY INSULATORS AND CONDUCTORS

Electricity travels in closed loops, or circuits. It must have a complete path from the power source through the wires and back. Some materials allow electricity to travel easily. These materials are called ***conductors***. Other materials prevent, or resist, the flow of electricity. These materials are called ***insulators***.

Before using the Energy Baton, hypothesize whether each material will be an insulator or conductor by circling the word. Using the Energy Baton, form a closed circuit with your group. Then test each material as part of the circuit to determine if it is an insulator or conductor. Record your results on the right side of the chart.

Hypothesis		Your Results
insulator or conductor	**straw**	insulator or conductor
insulator or conductor	**metal spoon**	insulator or conductor
insulator or conductor	**plastic spoon**	insulator or conductor
insulator or conductor	**fabric**	insulator or conductor
insulator or conductor	**cardboard/paper**	insulator or conductor
insulator or conductor	**aluminum foil**	insulator or conductor
insulator or conductor	**wood chopstick**	insulator or conductor
insulator or conductor	**rubber eraser**	insulator or conductor
insulator or conductor	**paper clip**	insulator or conductor

The electric utility department is working on an electric pole in your neighborhood. The workers wear rubber sleeves, gloves and boots. Describe why.

You are swimming on a hot summer day. A thunderstorm approaches and the lifeguards make everyone get out of the water. Describe why.