NAME: _____

Student Worksheet

Activity One

How Does a Hybrid Car Work?

Hybrid cars are powered partly by gasoline and partly by electricity. When the car is using energy stored in its batteries, it is saving on gasoline. Learn how hybrid cars work by reading about them. You could also ask a dealer that sells hybrid cars. Find out how hybrid cars are different from other cars. You can find information on the Internet about hybrid cars. Your teacher may be able to help you find websites or books that explain how hybrid cars work.

Here are some questions for you to think about as you do your research:

- What kind of energy does a moving car have?
- What energy transformation happens when a normal car slows to a stop?
- What energy transformation happens when a hybrid car slows to a stop?
- What kind of energy is stored in gasoline?
- In what other form does a hybrid car store energy?
- What energy transformations happen when a hybrid car uses its stored energy?
- Any other facts of interest to you

Record your findings in a one-page report.

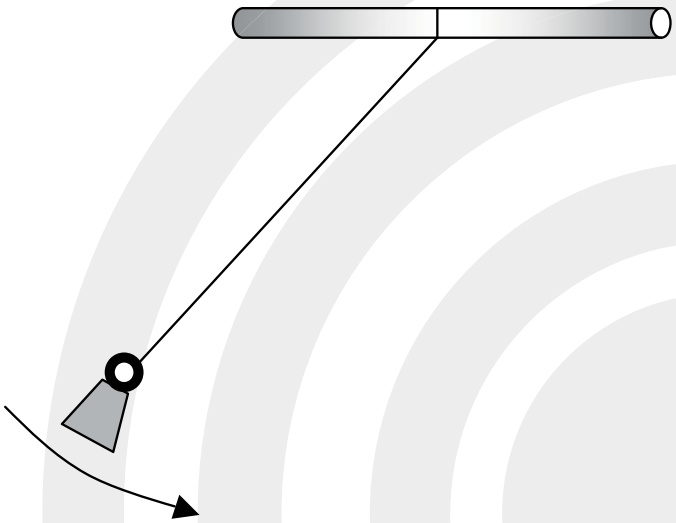
NAME: _____

Student Worksheet

Activity Two

Learn About the Motion of a Pendulum

When a pendulum swings back and forth, it transforms kinetic and potential energy back and forth. Make a simple pendulum like the one shown below.



To make your pendulum, tie a string to a weight. Tie the other end of the string to something it can swing from. Learn what can change the time it takes to make one complete swing. Use a stopwatch to time one swing. Or, you can time ten swings and divide that number by ten.

Now, see what can change the time it takes the pendulum to make each swing.

1. Try changing the amount of **weight** on the end of the string. Does this change the time of one swing?

2. Try changing how **high** you lift the weight before you let it go. Does the height change the time of one swing?

3. Try changing the **length** of the string. Does the length of the string change the time it takes for one swing?

NAME: _____

Student Worksheet

Activity Three

Study Heat Flow

Learn about heat flow between a warm object and a cold object.

For this activity you will need:

• 2 thermometers • a soft drink can • a pencil and paper

Follow these steps:

1. Fill a sink with cold water from the cold water faucet. Make the water level *less* than the height of the soft drink can.
2. Fill a soft drink can with hot water from the hot water faucet.
3. Use the thermometers to measure the temperatures of the water in the sink and the water in the can. Write the temperatures down.
4. Put the soft drink can in the sink.
5. Measure the temperature of the water in the sink and the water in the can every two minutes until they are the same temperature.

Record your observations. Here are some questions that may help you.

- How did the temperatures change?
- Why do you think the temperatures changed the way they did?
- Which had more thermal energy when you put the can in the sink—the water in the can or the water in the sink?
- Which direction did heat flow?
- Which gained heat—the water in the can or the water in the sink?
- Which lost heat—the water in the can or the water in the sink?
- Was the heat gained equal to the heat lost?

NAME: _____

Student Worksheet

Activity Four

Wave Motion

In this activity you will see that waves carry energy but they do not carry matter. You will also measure the wavelength, frequency, amplitude, and speed of a wave on water.

You will need:

- a small object that floats, like a piece of wood
- a ruler
- a stop watch

This is what you will do:

1. Find some flat, still, shallow water. A pond or a large puddle will do.
2. Place a piece of wood a few feet from the shore where you can reach it.
3. Drop a pebble into the water a few feet from the floating block.
4. As the waves pass the block, watch carefully how the block moves.
5. Hold the ruler straight up and down in the water with one end resting on the bottom and make waves again.
6. Read the high and low water levels on the ruler as the waves pass it.
7. Count how many waves pass the ruler in one minute.
8. Try to measure the distance between wave tops. You may have to move the ruler along with the waves as you read it.

Record your observations. Here are some questions that may help you.

- How did the block move? (This is the way the water particles moved.)
- What was the amplitude of the wave? (It was not the *total* difference between the high and low water.)
- What was the frequency of the waves?
- What was the wavelength of the waves?
- What was the wave speed? (To get this number, multiply the frequency times the wavelength.)

NAME: _____

Student Worksheet

Activity Five

The Law of Reflection Making a Periscope

Do you remember the LAW OF REFLECTION?

This law says that the angle of reflection equals the angle of incidence. This means that light bounces off a mirror at the *same angle* that the light hits it, only in the other *direction*.

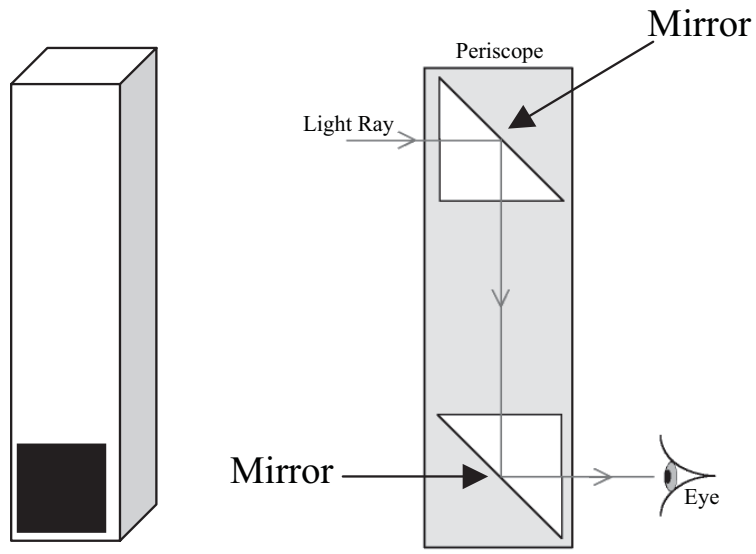
You can use this law to make a **periscope.** With a periscope, you can look over fences or around corners without being seen. A submarine has a periscope that the people inside can use to see above the water while the submarine is under water.

For this project, you will need:

- a long square box
- 2 small, square mirrors

Follow these steps to make your periscope:

1. Cut a square out of the bottom of one long side of the box (as shown on the left).



2. Cut another square hole on the other side, at the other end.
3. Cut slots to hold the mirrors so that one mirror is at each end (as shown on the right).
4. Look at the angles that the light path makes with the mirrors. Do they agree with the law of reflection? *Yes, they do*!

NAME: _____

Student Worksheet

Activity Six

Renewable and Nonrenewable Energy Sources

In this activity, you will learn more about a renewable energy source and a nonrenewable energy source.

Choose *one* renewable energy source from the list on the left that you would like to learn more about. Choose *one* nonrenewable energy source from the list on the right that you would like to learn more about.

Renewable Energy Sources	Nonrenewable Energy Sources
Wood	Coal
Wind	Oil
Solar	Natural Gas
Hydroelectric	Nuclear
Geothermal	
Biodiesel	
Tide and Wave Motion	

Research some facts about the sources of energy that you choose. Here are some questions you may wish to think about as you do your research:

- What is the original form of energy? (chemical, electromagnetic, thermal…)
- What form or forms is it changed into so it can be used?
- How does it cost compared to other energy sources?
- How plentiful is it (how much is there in the world)? Where can it be found and used?
- What are the main advantages of the energy source?
- What are the main disadvantages of the energy source?
- Any other facts of interest to you

Write down your findings in a short report. Include any pictures that you find. (Copy them or draw them yourself to help show what you found.)