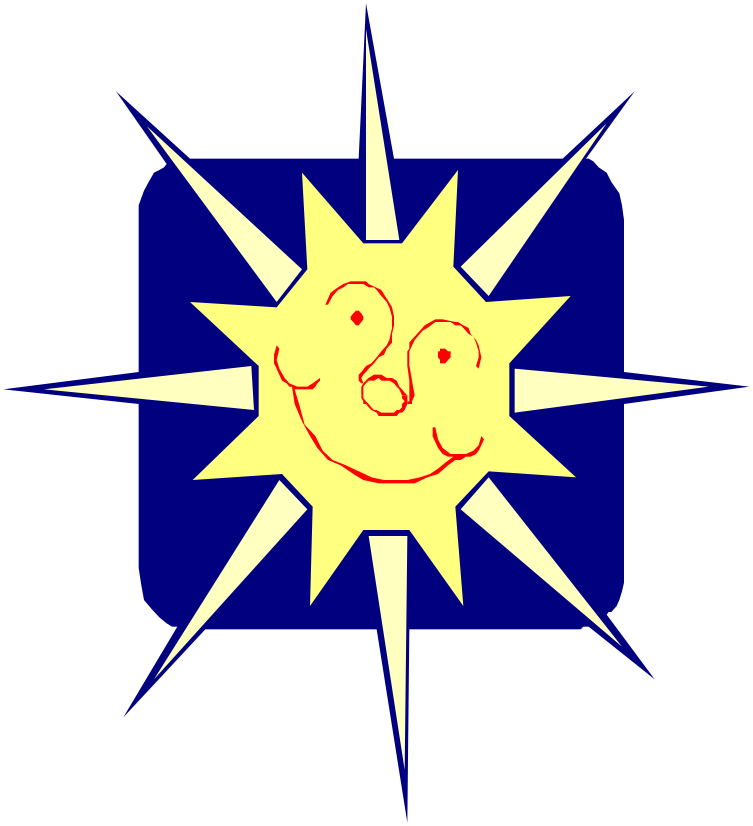
EXPLORING ENERGY



Teacher's Guide

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Exploring Energy

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Teacher's Guide

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EXPLORING ENERGY

Grade Levels: 2-5
Viewing Time: 17 minutes

INTRODUCTION

This video is designed for use in grades 2 - 5 as an introduction to the major ideas and concepts associated with the study of energy. There is a VIDEOTAPE VIEWER'S WORKSHEET that should be used during the showing of the program.

There are *four pause sections* in the tape that ask students to respond to questions by making choices on the worksheet. It is suggested that if the program is to be used with first and second graders that during the pause breaks the entire class discuss possible outcomes.

PROGRAM OBJECTIVES

After viewing the video and participating in the various activities, the students should be able to...

- Discuss how important energy is to our world.
- Identify the five main forms of energy.
- Describe how potential and kinetic energy are related.
- Tell why the sun is Earth's major source of energy.

SUMMARY OF THE VIDEO

This video stresses the idea that most of the energy of the earth can be traced to our sun. It distinguishes between potential and kinetic energy and how they convert from one to the other. The five main forms of energy--mechanical, chemical, heat, electromagnetic, and nuclear--are presented and described. Many real-life, real-world examples are given throughout the program.

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INTRODUCING THE VIDEO

Examples of energy are found all around us. Ask students to think about examples of energy. Write their responses on the board.

VIDEOTAPE VIEWER'S WORKSHEET

Explain that the videotape they will be watching today has four sections where a question will be asked. Hand out a copy of the Videotape Viewer's Worksheet to each student and explain that when the tape is paused during each of the four questions, they will have a chance to circle their choice on the worksheet that they feel is the best answer. If you use this worksheet with younger students, you may wish to use it as a whole class discussion as you explore possible outcomes together. Let the students identify possible outcomes and write their responses on the chalkboard. After sufficient discussion, start the tape to see what happens. Compare the student responses to the video's outcome.

Consider purchasing one of these "momentum demonstrations" for your classroom. Students are always amazed at the different variations and outcomes.

TEACHER PREPARATION

Before presenting this lesson to your students, we suggest that you preview the video and review this guide and the accompanying backline master activities in order to familiarize yourself with their content. Duplicate the blackine master activities you intent to use. See page 3 for a description of the blackline master activities. The answer key is provided on page 5.

As you review the instructional program outlined in this guide and the accompanying blackline master activities, you may find it necessary to make some changes, additions or deletions to meet the specific needs of your class. We encourage you to do so, for only by tailoring this program to your students will they obtain the maximum instructional benefits afforded by the material.

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FOLLOW-UP ACTIVITIES

Most of the follow-up activities for this program are designed for third through fifth graders. If you use this program with a younger audience, you will need to adapt the materials accordingly.

• **Videotape Viewer's Worksheet** is to be used during the showing of the program. Students are to respond to four questions on this worksheet. (See the section "Videotape Viewer's Worksheet.")

• **How Do You Use Energy?** is a matching exercise. Students are to match different common household items with the type or form of energy they represent.

• **Examples of Energy** is an exercise in locating examples of energy from newspapers and magazines. Students should cut out the labels from this sheet and glue them to separate sheets of construction paper. Then they should explore newspapers and magazines to find examples of energy in use. These pictures are to be cut from the newspapers or magazines and glued to the sheets of construction paper that best represents the form of energy they show.

• **The Pendulum** is an experiment about the motion and behavior of a pendulum. Teachers in younger grades may want to demonstrate how to set up the equipment and count the swings. A swing is from starting position all the way across and back again. Because this requires keeping track of the number of swings in a minute, you will probably have to do this together as a class.

• **The Five Main Forms of Energy** is an assignment involving the use of newspapers or magazines. Students are to find articles that make reference to one of the forms of energy. They should cut out the articles and circle the energy words.

• **The Height of a Dropped Weight** is an experiment about the effect that a fish weight has when colliding with a stationary block of wood. The height of the drop is varied and then readings of how far the block of wood is propelled after the collision are compared.

• **The Mass of a Dropped Weight** is similar to the previous experiment except that this time the weight is changed. We are interested in observing the effect of increased weight on the distance that the block of wood is propelled. You will probably want to make comparisons of the data collected during both of these experiments.

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• **The Quiz** is a test of knowledge concerning this topic of energy.

CLASS ACTIVITIES AND DISCUSSION

1. The idea that most of the Earth's energy comes from the sun is a hard concept to understand, so reinforce it in class with examples of how we can trace things back to the sun. Here is an example: A toaster is used to toast bread. The toaster turns electricity into heat which cooks the bread. The electricity is produced at a power plant when a coil of wire is spun in a magnetic field. The coil of wire is turned by mechanical energy that is produced when steam is forced past turbine blades. The steam is produced when heat is used to boil water. The heat is produced when coal is burned. The heat energy comes from the coal, which is an example of chemical energy. The coal formed over millions of years from the buried remains of prehistoric plants and animals. The plants got their energy from the sun. So the energy stored in the coal fuel goes back to the energy given off by the sun millions of years ago.

2. To illustrate the idea of potential energy, give the students a rubber band. Have them pull the rubber band apart and hold it still. The stretched rubber band represents potential energy. The students should be able to feel the strength of the potential energy stored in the rubber band. If the rubber band is released, the potential energy will change to kinetic energy as the rubber bands fly. You may want to describe this part instead of actually releasing the rubber bands. Ask the students to explain where the potential energy came from that they could feel in the rubber band.

3. Ask students to explain the importance of energy in our world. (An swers will vary.)

4. Have the students name the five main forms of energy. Write their correct answers on the chalkboard as column headings. Then have students give examples of each and write their correct responses under the appropriate column heading. (Mechanical, Chemical, Heat, Electromagnetic, and Nuclear.)

EXTENDED LEARNING ACTIVITIES

• Read Discusion Question 1. Using the content of this question, have a small group of students illustrate what is happening in the form of a mural.

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ANSWER KEY

• **VIDEOTAPE VIEWER'S WORKSHEET** is to be used during the presentation.

Pause One: 2
Pause Two: 3
Pause Three: 3
Pause Four: 3

• **HOW DO YOU USE ENERGY?**
Mechanical energy: scissors, iron, vacuum cleaner, broom
Heat energy: frying pan, hair dryer, iron
Sound energy: radio, television
Electrical energy: radio, flashlight, microwave, hair dryer, television, blender, vacuum cleaner, table lamp, iron
Light energy: flashlight, table lamp

• **EXAMPLES OF ENERGY**
Answers will vary.

• **THE PENDULUM**
The number of swings for a pendulum per minute is not affected by the height from which it is dropped or the weight of the pendulum. What determines the number of swings per minute is the length of the string. See if students can discover the relationship by comparing results. Their results will probably not be identical because of different lengths of string.

• **THE FIVE MAIN FORMS OF ENERGY**
Have students compare articles that they find in magazines and newspapers. Have them share the energy words that they come across.

• **THE HEIGHT OF A DROPPED WEIGHT**
The block should be propelled greater distances as the height from which the weights are released increases.

• **THE MASS OF A DROPPED WEIGHT**
The two weights should have caused the block to be propelled a greater distance when compared with the data from the previous experiment. The amount of energy or momentum is affected by the speed and / or the mass of the object.

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• QUIZ

PART A

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

PART B

1. ANSWERS WILL VARY, but could include such things as: people walking or running, animals hunting, cars moving, riding a bike, a rocket taking off, anything that is moving.

2. When we eat food we are getting the energy of the sun that was absorbed and used by plants to make their food. Whether we are eating foods that come from plants or meats from animals it is still energy from the sun that is released.

3. a. A b. B c. D

SCRIPT OF VIDEO NARRATION
EXPLORING ENERGY

Examples of energy can be found all around us. Nature is full of energy from the power of running water to the electrical power of lightning. Animals need energy to survive, to run, play, and hunt. Energy is used by people to warm their homes, cook their food, light their way, and to make it through our busy days.

But what is energy and where does it come from? That's what this program is all about. It's all about ENERGY.

There is a viewer's worksheet you may wish to use with this program. There will be a few times during the tape where a question is asked and the suggestion to pause the tape is given. You can put answers on the viewer's worksheet or discuss possible answers as a class. Then start the tape to see if your guesses were correct or not.

Energy is the ability to make things happen. It's the ability to do work. Cranes need energy to lift heavy loads. The fuel that the crane burns provides the necessary energy.

Animals need energy for just about everything they do. Their energy comes from the food they eat. It isn't difficult to look around and see all kinds of examples of energy. And almost all the energy on earth comes from the sun.

The sun's energy travels 93 million miles through the emptiness of

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space to reach our planet in the form of light, heat, and other forms of energy. The sun is important to all living things on earth. Plants use the sunlight and water and minerals from the soil to make food. Animals depend on the plants. Some animals eat the plants to get energy while other animals eat the plant-eating animals to get energy. Some animals, such as humans, eat plants and animals for food. The food is used by the body to do things, such as exercise, work, and just move.

Food is chemically broken down and mixed with oxygen to release the energy needed to do things. The amount of energy food contains is measured in calories and a special piece of equipment is used to determine this. A sample of the food is burned inside a sealed container which captures the heat energy released, and uses it to heat a known amount of water. The temperature before and after burning the food is recorded and then used to figure out how many calories of heat energy are released by the food.

Our bodies need a certain amount of these food calories to operate throughout the day. If you aren't active and just sit around, the extra food calories are changed to fat for use later.

All plants and animals need food to live. Plants are the only ones that can make food and, as stated before, they need the sun to do that. So when we eat food, we are really using the energy from the sun that was stored in the plant.

Energy changing from one form to another is behind everything that happens. Scientists refer to two kinds of energy: potential and kinetic.

Potential energy is stored energy, or energy of position. If a book is lifted to the edge of a table, it has potential energy. Someone has used muscle energy to lift the book against gravity to the height of the table. The potential energy is stored energy waiting to be released. If the book falls, it will hit the floor with a force causing a loud sound, and if someone's foot is in the wrong place, a great deal of pain.

The book falling is an example of kinetic energy, or the energy of motion. On a roller coaster ride the first hill is always the highest. A huge motor is used to pull the cars to the top of this hill. This represents a great deal of potential energy because the motor has used energy to lift the car and the people inside against gravity. When the coaster cars go over the top of the hill and head down, the potential, or stored energy, changes to kinetic, or energy of motion. The first hill has to be the highest so that the greatest amount of potential energy can be stored up in the cars.

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A battery has chemical potential energy. The chemical energy is stored until the battery is attached in a circuit. Then the chemical energy is changed to electrical energy. In this circuit it is used to light a bulb.

Wood has stored chemical energy as well. When the wood is set on fire, we see the release of this energy as light and heat energy. The light and heat energy move from one place to another, so they are examples of kinetic energy--energy of motion.

Energy can appear in many forms and it can change from one form to another; just as the chemical energy of a battery can change to the electrical energy needed in the circuit to light the bulb. The bulb gives off light and heat energy.

There are five main forms of energy--mechanical energy, heat energy, chemical energy, electromagnetic energy, and nuclear energy.

Mechanical energy is the energy of motion. Water rushing down a stream is an example of mechanical energy. The wind blowing or a person running are examples of mechanical energy.

Heat energy is related to the movement of the particles that make up matter. These particles are called atoms, and they are always moving. The movement of atoms causes heat energy; the faster the movement, the more heat energy is produced. You can feel heat energy if you rub your hands together quickly. The mechanical energy of rubbing your hands changes to heat energy.

Chemical energy is stored in fuels, such as charcoal, gasoline, and even food. When we burn charcoal in a grill, the stored energy is released as heat energy to cook our food. When we eat the food, the chemical energy stored in the food is used to power our muscles.

A rocket burns fuel and uses it to launch off the ground.

Electromagnetic energy is seen in the form of electricity and light. Electricity is used everyday in our homes to power tools and equipment that run on electricity. Light is also an example of electromagnetic energy that is necessary to daily life.

Nuclear energy has to do with the nucleus or center of an atom. When this center splits, it releases a large amount of energy. This is called fission and is what happens at a nuclear power plant. When atoms join together, or fuse, they also release energy. This is what happens

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on the sun as hydrogen atoms join to form helium atoms and tremendous energy is released.

Sometimes energy can be made to change from one form to another instantly. Here is a solar cell panel. The solar cells on it can change sunlight into electricity. When we expose the panel to sunlight, electricity is produced immediately. Notice the needle on this voltameter moves as sunlight strikes the panels. The voltameter is indicating that electricity is produced.

Energy is neither created nor destroyed. It changes from one form to another. Some energy may be lost to friction and air resistance, but the overall amount of energy stays the same.

Here is an example. Look at this set-up of five metal balls hanging from strings of the same length. The balls are all exactly the same. What do you think will happen if we lift one ball and then release it? Pause the tape a minute and circle on your viewer's guide what you think will happen. (Pause)

If you thought that only one ball from the end would pop out, you're correct. Notice that it goes up almost as high as the first ball and then swings back, hitting the group and sending the first ball flying again; each time the height that the two balls reach is less until eventually, they would stop this back and forth movement. This back and forth movement doesn't continue forever because energy is being changed to heat because of friction and air resistance.

Now let's change things a bit. This time, we will release two balls from one side. What do you think will happen? Pause the tape and make your choice. (Pause)

As you can see, two balls from the other side bounce out. Scientists call this the conservation of energy which simply means energy is neither created nor destroyed. It is transferred, or changed, from one form to another.

Let's try another set up. This time, we will release three balls from one side. There are only two balls left hanging straight down. What do you think will happen this time? Pause the tape and make your selection. (Pause)

Were you surprised by what happened? One of the balls joins the two so that the amount of kinetic energy is equal.

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Now let's change things by releasing one ball from each side at the same time. Pause the tape and think about what might happen. (Pause)

Did you expect the balls to bounce back out? As long as the strings don't get tangled, you could do this with different numbers of balls.

When we lift a ball to a certain point before dropping it, we have given it potential energy. Someone has used their muscles to lift the ball against gravity to a certain height. When the ball is released, it begins to swing down. The potential, or stored, energy is changing to kinetic energy, or energy of motion. When the ball hits the group of balls, the energy is transferred, or moved, from one ball to the next until the ball on the end is pushed into the air against gravity. This ball reaches a certain height and stops; at that point it has potential energy. Then it begins to swing down, which means its potential energy is changing to kinetic energy.

Look at this amusement park ride and think about how it might be another example of potential energy changing to kinetic energy, and then kinetic energy changing to potential energy, and so on and so on. How much kinetic energy an object has depends on two things: how much mass the object has and how fast the object is moving.

Forms of energy are all around us. At a fair we could find many examples of energy. The lights are examples of electrical energy changing to heat and light energy. We hear the sounds of the rides and that too is a form of energy--sound energy. The moving parts of the rides are all examples of what is called mechanical energy. The food sold at the fair is cooked with heat energy. When we eat the food, our bodies change the chemical energy stored in the food to other forms of energy to move our bodies or let us create our own sound energy.

Remember that most of the energy of our planet actually comes from the sun. Food contains stored energy from the sun. Even the gasoline that cranes and trucks and cars use has energy from the sun stored in it. These fuels come from fossil fuels that were formed over millions of years.

During prehistoric times, the plants soaked up and used the energy of the sun. Then these plants died and were buried beneath huge layers of earth over a long period of time. These plants changed into natural gas and oil which are then mined and made into fuels for our machines.

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Energy is what keeps things moving. Energy can be found in different forms, such as sound, light, heat, electrical, and mechanical. Energy is everywhere and is found in all that we do and see.

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2

EXPLORING ENERGY
Program Quiz

Name _____

Directions: At the end of the program there is a quick quiz. You can answer the questions on this sheet.

1. How are potential and kinetic energy different from each other?

2. What are the seven main forms of energy?

3. The law of conservation of energy states that energy is neither created nor destroyed. What does this mean?

4. What are nonrenewable resources? Give some examples of nonrenewable resources.

5. What are renewable resources? Provide some examples.

6. What are some of the problems associated with burning fossil fuels?

7. Why are nonrenewable resources also called fossil fuels? How were they formed?

8. Why is the conservation of energy so important?

9. What are some things people can do to conserve energy?

1

EXPLORING ENERGY
Pre-test

Name _____

A. Directions: Give a definition for each of the following terms.

1. potential energy
2. kinetic energy
3. friction
4. air resistance
5. mechanical energy

B. Directions: The following questions need a short answer.

1. Give a definition for nonrenewable resources and identify some of these resources.

2. What are renewable resources and what are some examples?

3. How are potential and kinetic energy related?

4. How does a roller coaster demonstrate potential and kinetic energy in action?

5. Give a description for each of these renewable resources.
   a. solar energy
   b. wind energy
   c. geothermal energy
   d. biomass energy
   e. hydropower

EXPLORING ENERGY
Energy Transformations

Name _____

Directions: Describe what is happening during these energy transformations.

1. After lunch a boy rides his bike to his friends house.
   Chemical energy transforms to mechanical energy.

2. A driver fills his car with gas and then drives three hundred miles.

3. The electric toaster is plugged into the outlet and is used to make dinner.

4. Sunlight shines on a tree.

5. Coal is burned in the furnace of a power plant.

3

EXPLORING ENERGY
Photosynthesis

Name _____

In the process of photosynthesis, plants convert radiant energy from the sun into chemical energy.

Here is the formula for photosynthesis:

$$6H_2O + 6CO_2 + \text{sunlight} \longrightarrow C_6H_{12}O_6 + 6O_2$$

It means: Water plus carbon dioxide plus sunlight equals sugar plus oxygen
The sugar is in a form called glucose.
Carbon dioxide is a gas exhaled by animals.
Plants are the only food making organisms.

Questions:

1. Animals are completely dependent upon plants for food. Even the animals that eat other animals are dependent on plants. Explain.

2. Photosynthesis is crucial to life on earth in another way besides as the main food supply. What else does photosynthesis continually supply?

3. Plants are extremely important to all life on earth. Name some things that humans are responsible for that are endangering plants?

EXPLORING ENERGY
Post Test

Name _____

Part A Directions: Answer the following multiple choice questions by circling the correct answer.

1. Energy is the ability to do _____
   a. work b. power c. acceleration d. speed

2. The fuel used in a rocket is energy stored as _____
   a. mechanical energy b. nuclear energy c. chemical energy d. electromagnetic

3. Energy of motion is _____
   a. kinetic b. potential c. chemical d. solar

4. A rubber band stretched between two fingers is an example of _____
   a. kinetic energy b. potential energy c. chemical energy d. solar energy

5. An energy resource that uses the heat from the earth is called _____
   a. solar b. geothermal c. wind d. hydropower

Part B Directions: Answer the following short-answer questions in the space provided.

1. Almost all energy can be traced to the sun. Explain how this fits in with the food we eat.

2. What are the nonrenewable energy resources?

3. Name the renewable energy resources.

4. What are some of the problems associated with the burning of fossil fuels?

5. What are some of the ways individuals can conserve energy?

EXPLORING ENERGY
Consumption by Source

Name _____

We use energy from many different energy sources in our daily lives. Energy sources can be classified as either renewable or nonrenewable sources. Renewable resources can be replenished in a relatively short period of time. Nonrenewable resources are in limited supply. They are resources that were formed over millions of years. During prehistoric times, small microscopic animals and plants died and sank to the bottom of ancient seas. Sediment built up over millions of years creating tremendous pressure and changing these remains into sources of energy.

Here is a chart that describes the percentage of consumption in the United States for various sources of energy.

Directions: Identify each energy resource as either renewable or nonrenewable. Then answer the question at the bottom of the page.

Source of Energy	Percentage of Use	Renewable or Nonrenewable	
Petroleum	38.5%		
Natural Gas	22.9%		
Coal	22.8%		
Uranium	8.2%		
Biomass	3.0%		
Hydropower	2.4%		
Propane	1.6%		
Geothermal	.3%		
Solar	.1%		
Wind	.1%		

1. What can you determine from the information in this chart?

EXPLORING ENERGY
Examples of Energy

Name _____

Directions: Look in magazines and newspapers to find pictures of things that use energy and cut them out. Cut these labels out and paste them to pieces of construction paper. Then paste the pictures you have cut out onto the same piece of construction paper as the kind of energy it represents.

Mechanical Energy
(muscle power or the energy of motion)

Electrical Energy

Heat Energy

Light Energy

Sound Energy

Chemical Energy

Nuclear Energy

6

Name _____

EXPLORING ENERGY
The Height of a Dropped Weight

Purpose: To determine how speed and height relates to the energy of a dropped weight.

Materials: two rulers fish weights twine block of wood two books

Procedures:

1. Set the ruler on a desk or table so that about three inches of the ruler hang over the edge.
2. Use books to hold the ruler in place.
3. Tie a fish weight to one end of the twine.
4. Tie the other end of the twine to the part of the ruler hanging over the edge of the table. The weight should be about 3 centimeters off the floor.
5. Make a mark on the floor where the weight hangs down straight.
6. Place the block of wood on that mark so that it is standing up.
7. Lift or pull back the weight so that it is about 10 centimeters off the floor.
8. Release the weight and watch it hit the block of wood. Measure how far the block goes from the mark on the floor you made before. Record below.
9. Repeat this with other dropping heights. Record data in the chart below.

Observations:

Distance block is hit	10cm drop	20cm drop	30cm drop	40cm drop

Conclusions: Compare the different trials. Which drop height caused the block to be hit the furthest?

7

EXPLORING ENERGY
The Mass of a Dropped Weight

Name _____

Purpose: To determine how mass relates to the energy of a dropped fish weight.

Materials: two rulers twine two fish weights block of wood two books

Procedure:

1. Set the ruler on a desk or table so that about three inches of the ruler hang over the edge.
2. Use books to hold the ruler in place.
3. Tie 2 fish weights to one end of the twine.
4. Tie the other end of the twine to the part of the ruler hanging over the edge of the table. The weights should be about 3 centimeters off the floor.
5. Make a mark on the floor where the weights hang down straight.
6. Place the block of wood on that mark so that it is standing up.
7. Lift or pull back the weights so that they are about 10 centimeters off the floor.
8. Release the weights and watch them hit the block of wood. Measure how far the block goes from the mark on the floor you made before. Record below.
9. Repeat this with other dropping heights. Record data in the chart below.

Observations:

Distance block is hit	10cm drop	20cm drop	30cm drop	40cm drop

Conclusions: How does the data from this experiment compare with the data on the sheet about dropping distances and only one fish weight?

EXPLORING ENERGY

Name _____

Pendulum

Galileo Galilei was nineteen when he noticed a lamp suspended from a church ceiling swing back and forth. He was fascinated by the nature of the swings and later conducted many experiments related to pendulums.

Purpose: To discover some of the properties of pendulums. What effects the number of swings of a pendulum within a minute? Is it the height the pendulum is released? Is it the weight at the end of the pendulum? Is it the length of the pendulum?

Materials: strings of various lengths
Washers or fish weights

PART A: HEIGHT OF RELEASE

Procedures:

1. Cut a piece of string of any length and attach a washer or a weight to one end.
2. Hold the other end in one hand and with your free hand pull the weighted end of the string up to be released in a pendulum swing.
3. Release the weighted end and count the number of complete swings the pendulum makes in exactly one minute. You may have to have someone else do the timing for you. Record the number of swings on the chart marked Part A on the next worksheet.
4. Repeat this procedure at least two more times but change the height at which you release the weighted end of the string.

PART B: LENGTH OF STRING

Procedures:

1. Cut pieces of string of various lengths to make pendulums.
2. Tie a washer or a weight to one end of each string.
3. One at a time, test each pendulum for the number of complete back and forth swings it makes in a minute's time.
4. Record results on the chart marked Part B.

EXPLORING ENERGY
Pendulums Page 2

Name _____

PART C: WEIGHT AT THE END OF THE STRING

Procedures:

1. Use a single length of string for this experiment.
2. Tie a washer or weight to one end and record the number of complete swings made by the pendulum in one minute.
3. Now add another weight and count the number of swings in a minute. Record your findings on the chart marked Part C.
4. Repeat this a couple more times adding additional weight each time.

Observations:

Part A: Height of Release

height of release	number of swings in one minute
low release	
middle release	
high release	

Part B: Length of String

length of string	number of swings	length of string	number of swings

Part C: Weight at End of String

number of weights	number of swings	number of weights	number of swings

Conclusions: What do these findings tell you about pendulums?

EXPLORING ENERGY
Renewable and Nonrenewable Resources

Name _____

Energy resources are divided into two categories; renewable and nonrenewable resources.

Nonrenewable resources include coal, petroleum (oil), natural gas, propane, and uranium. Most of the energy used in the United States comes from these nonrenewable resources that are often referred to as fossil fuels.

Renewable resources include solar, biomass, wind, geothermal, and wind energy resources.

Directions: Fill in the following table with advantages and disadvantages for each of the energy resources.

Energy Resource	Advantages	Disadvantages
Fossil Fuels (coal, petroleum, natural gas)		
Nuclear		
Hydropower		
Solar		
Wind		
Biomass		
Geothermal		

EXPLORING ENERGY
Fossil Fuels

Name _____

Directions: Here are some questions to answer concerning fossil fuels.

1. Fossil fuels are considered nonrenewable energy resources. What does that mean?

2. Why are these resources referred to as fossil fuels?

3. Give examples of fossil fuels and include how they are used.

4. What are some of the problems associated with the use of fossil fuels?

5. What are some of the problems associated with a dependence on fossil fuels?

EXPLORING ENERGY
Renewable Resources

Name _____

Directions: Answer these questions about renewable energy sources.

1. What are renewable energy resources?

2. What are the advantages and disadvantages of using these resources?
   a. Geothermal
   b. Wind
   c. Solar
   d. Biomass
   e. Hydropower

3. Why will renewable resources become more important in the future?

4. What are some important advantages of using renewable resources instead of nonrenewable energy resources?

5. Currently renewable resources represent a very small percentage of the overall energy consumption in the United States. Why?

EXPLORING ENERGY
Conserving Energy

Name _____

Questions:

1. Why is it so important to conserve energy?

2. What is acid rain and how is it produced?

3. What are the greenhouse effect and global warming? How are they potentially harmful?

4. Why is the burning of fossil fuels so harmful to the environment?

5. Identify ways for conserving energy. What are some of the ways that people can conserve energy on a regular basis?

Public Service Announcement

Directions: With your team create an audio or television public service announcement. The idea is to share information about a specific topic and then give suggestions for improved use.

Select from the list of topics and then determine your approach for creating an audio or video commercial.

List of topics:

Fossil Fuel Problems
Renewable Energy Resources are the Future
Greenhouse Effect Issues
Global Warming
Acid Rain
The Need for Energy Conservation
Ways to Help With Energy Conservation

Preparation:

1. Use brainstorming to generate ideas. Record ideas on index cards.
2. Choose the ideas, which you feel are the best.
3. Arrange the index cards in an order for the presentation.
4. Look at each card and decide what props you will need, who will perform which parts, and any music or sound effects you will need.
5. Based on the cards write a script.
6. Identify the locations you will want to use during the production.
7. Gather the necessary audio or video equipment.
8. Rehearse the script.
9. If you are doing a television commercial you may want to consider title cards or other poster board graphics to help draw attention to key concepts or terms.