

Energy: What's It All About

Grades 2-3

Overview

The students will observe and discuss different sources of energy. The students will make 3 things that fly using their energy and the wind's energy.

Objectives

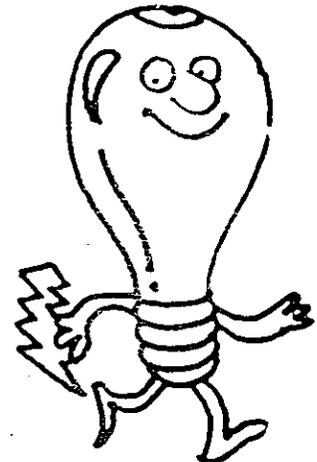
- To help students understand that energy is the capacity to move, heat or light things.
- To help students understand that there are many different types of energy sources.
- To help students understand that an energy source releases energy in the form of heat, light, sound, electricity or motion.

Materials

For the presenter:

Potential Sources of Energy:

- fan
- a plant
- food
- coal
- oil
- mixer
- lamp
- pinwheel
- pitcher of water or a water faucet in the classroom
- wood
- flashlight / batteries
- picture or drawing of the sun



For each student:

- 1 regular straw
- 2 large straws (must be larger than the other straw)
- 1 copy of the Funcopter
- 3 paper clips
- 2 strips of paper 1" x 8 1/2"
- scotch tape
- scissors
- crayons or markers

Getting Ready

Activity 1

Set all the sources of energy on a table in front of the class. Write *Sources of Energy* on the chalkboard. Activity 2: Put straws, tape, paper, paper clips, and copies of the Funcopter on a table that has easy access by the students. Make a sample of the Loop Plane, Fun-copter and Rocket Launcher.

Procedures

Activity 1: Energy Sources

1. Tell the students you brought some sources of energy to share with them. Ask: "What is Energy? Why do we need Energy?"
2. Write *Sources of Energy* on the chalkboard. Ask: "What does the word *source* mean?" Make sure all the students have an understanding of it. "What is a source of energy? Can you think of other examples?"
3. Share the energy sources that you brought: *wood, water, oil, sun, food, electricity, batteries, etc.* Write the names of these on the board as you share each one. Discuss with the students that these sources of energy are used by people to produce something that they need. Hold up the sources of energy again, one at a time, and ask: "What do people want when they use this source of energy? For example: wood - people burn wood to get *heat* to stay warm." (write heat on the board by wood). Plug in the mixer and the lamp.

Ask: "What do people want when they plug these into the electric outlet?" They want the *motions* of the beaters and *light* from the lamp. Keep in mind that *energy sources release energy in the forms of heat, light, sound, electricity, & motion.*" When the students respond with one of these, write it on the board next to its source of energy. Follow the same procedure for all the sources that you brought. Review with the students how energy is released in the form of heat, light, sound, electricity or motion. Refer to their ideas that you put on the board.

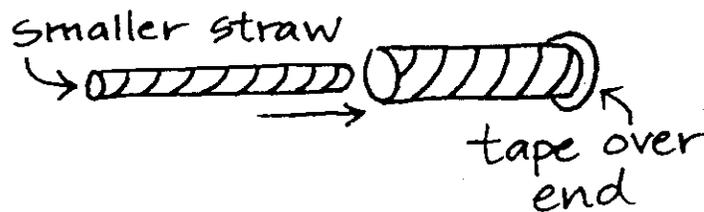
<p>Sources of energy wood → heat food → motion water → electricity</p>
--

Activity 2: Using the Wind's Energy

1. Tell the student that they are going to make 3 things that use their energy plus the wind's energy to fly.
2. Show the students the samples of the three projects. Demonstrate how to make each one and how they fly. Tell the students that after they finish making their projects, the class will go outside and experiment flying them.
3. Hand out the materials for the first project, and the students can pick up the materials for the other 2 projects when they are ready for them.

Rocket Launcher

- Cut 1 big straw in half. Tape one end of both halves closed.
- Take the thinner straw and put it inside one of the halves.
- Blow on the end of the thin straw and the watch the big one fly.

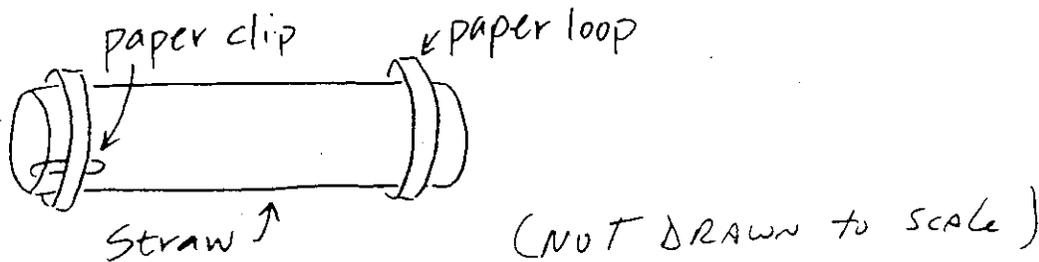


Funcopter (see attached sheet for sample)

- Decorate your Funcopter shape.
- Cut out the funcopter shape. Cut only on solid lines.
- Fold on dotted lines.
- Fold down the wings so one is on each side of the Funcopter.
- Fold the tail part of the Funcopter on the dotted lines.
- Hang 2 paper clips on the bottom for weight.
- Hold you Funcopter, tail down, as high as you can and let it go.

Loop Plane

- Attach a paper clip to one end of a large straw.
- Decorate 2 strips of 1" x 8 1/2" paper.
- Tape the strips into loops.
- Tape one loop to each end of the straw.
- The paper clip end of your straw needs to point forward.
- Your Loop Plane is ready to fly.

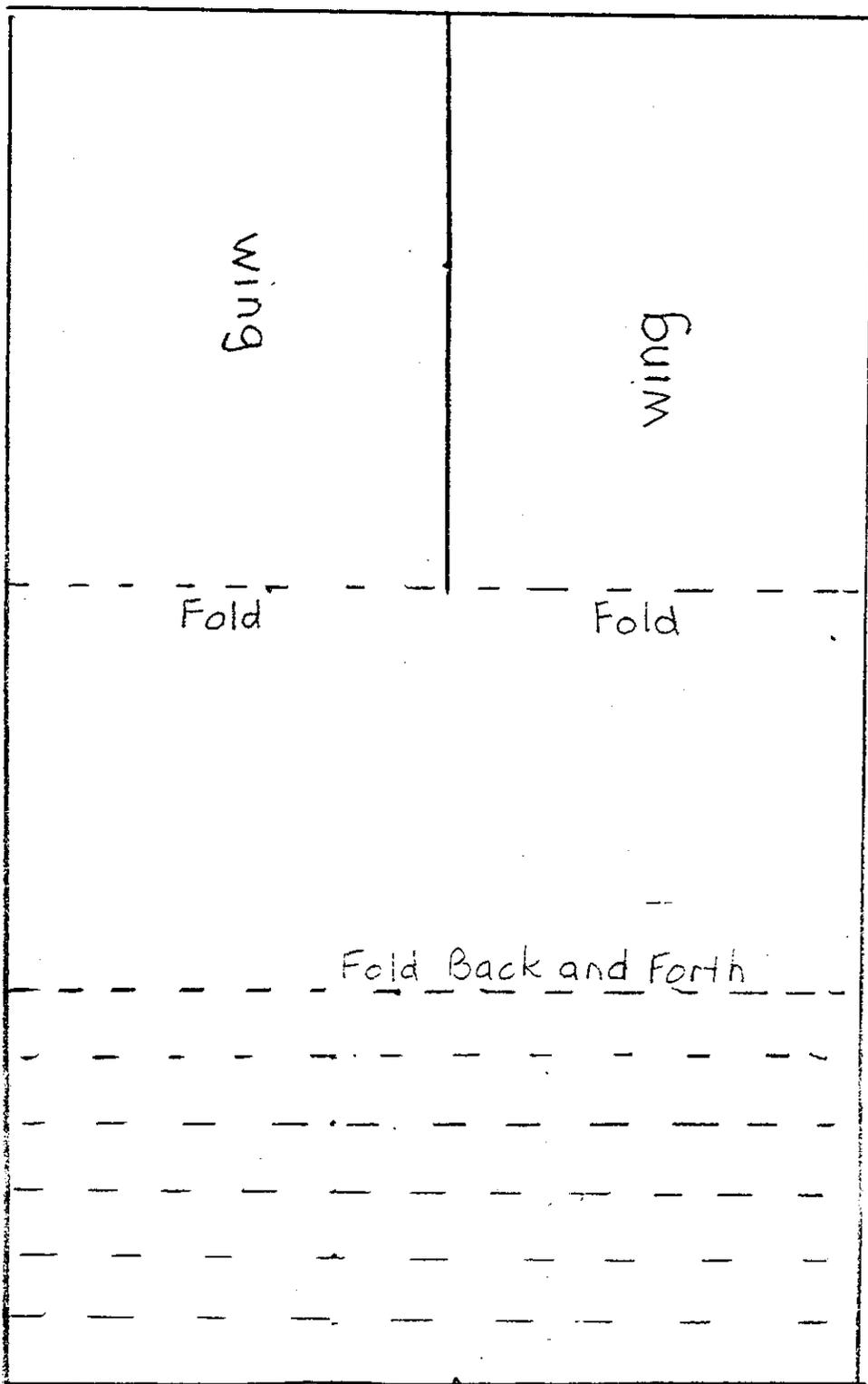


After everyone has completed their projects and cleaned up their space, take the students outside to test fly their creations.

Closure

After the projects are put away, Ask: "What sources of energy did you use to fly your projects? What happened to your projects when energy was released? (*motion - when the planes, etc. flew*)

Fun-copter



Hang 2 paper clips here

Heat Energy

Grade 2-3

Overview

The students will explore heat energy. They will make friction by rubbing things together and create wind using a lamp.

Objectives

- To help students understand that heat is a form of energy.
- To help students understand that rubbing two surfaces together produces heat energy.
- To help students understand that heat energy causes air to move, making wind.

Materials

For the presenter:

A variety of things that produce heat:

- a candle
- match
- electric frying pan
- lamp
- heater
- hair dryer
- 4 lamps for activity 2

For each group of 4 students:

- 1/2 tsp. of talc powder
- 4 snake patterns
- 4 pencils
- 4 pairs of scissors
- crayons or markers
- 2 balloons
- 2 pieces of sandpaper
- 1 tub



Getting Ready

Activity 1

Put all the things that produce heat energy on a table in front of the class. Write *heat energy* on the chalkboard.

Activity 2

Organize the materials for each group in a tub. Set up the four lamps on a table where you will be able to supervise the students when they are using them. The lamps need to be plugged in.

Activity 3

Use the same lamps as in Activity 2.

Procedures

Activity 1: Heat Energy

Use the questions and discussion below to spark the student's interest and get them thinking about heat energy. Start by plugging in the electric heater. Choose a student to come up and feel the heat coming from the heater (use **caution** around heat). Continue to share the different things you brought as you discuss heat energy.

Questions

“What do you feel? (*heat*) Where is the heat coming from? (*electricity, fire, etc.*) What is creating the heat?” (*energy in the form of electricity, energy in the form of fire, etc.*) Refer to the words *heat energy* on the chalkboard. “What is our main source of heat energy?” (*sun*) Write sun on the chalkboard. Use these same kinds of questions with each of the things you share. “What happens when you use heat energy?” (*the electric frying pan will cook meat, the hair dryer will make the water evaporate, etc.*)

Discussion

Most energy comes from the sun. Energy is what makes things happen. Energy sources release energy in the forms of heat, light, motion, sound and electricity. Heat is a form of energy that is used by all living things. On days when the sun is out, you can feel the sun's energy. The heat we use on earth comes from different sources: the sun, fire, friction, nuclear energy.

Activity 2: Friction Makes Heat

1. Tell the students that their group will get a tub of materials. They are going to use them to explore heat energy. As they do the experiments, they should be thinking about the source of energy or where the energy is coming from. Also, what happens when the energy is released, what comes from the energy you started with. Example: "I started with the motion of my hands rubbing together (*energy source*) and I ended up with heat (*form of energy produced*).
2. Before handing out the tubs of materials, show the students what is in each tub. Explain that you will all be doing the experiments together. It is important that they are listening, following directions and taking turns in their groups.
3. Hand out the tubs. Have students place the tub in the middle of their table area.
4. Ask: "Do you know what friction is?" Write the word *friction* on the board.
5. This is friction - demonstrate rubbing your hand together.
6. "Rub your hands together. What do you feel? (*heat*) What is your source of energy? (*my hands rubbing together*) What form of energy was created when you rubbed your hands together? (*heat*) Whenever you rub two objects together it produces heat."
7. "Let's try and see if we can produce heat by rubbing other things together. Take out the two pieces of sandpaper. Take turns with your group and see if the paper produces heat. What did your team discover? What was the source of energy that you used? (*movement of hands*)? What form of energy was produced when you rubbed the sandpaper together? (*heat*) Was it different than using just your hands?"

Try the same thing with two balloons and see what happens. First, you will need to blow up your two balloons. Then rub the two balloons together. "What do you think will happen? What would cause one of the balloons to pop? (*It gets so hot, one balloon starts to melt and pops*)



Activity 3: Heat makes Wind

1. Turn on lamps. Tell students to be very careful because the light bulbs will get hot. The light needs to be hot for this experiment to work. It should be hot enough by the time the snakes are ready. Explain to the students that they will take turns coming up to the table to use the lamp for heat.
2. Color and cut out the snake pattern.
3. Balance the head of the snake on the point of your pencil.
4. Taking turns, have 4 students come up to the table. Make sure you are supervising the students so no one gets burned. Hold your pencil with the balanced snake just above the bulb. **BE VERY CAREFUL!!!!!!!!!!** Watch to see what happens. Why does the snake start to turn? What is the energy source that is making it move? (**heat**) It creates what form of energy? (**motion**)

Discussion

The snake started to spin because the hot light bulb warmed the air around it. Hot air rises and thus creates a wind. The wind causes the snake to turn. Wind is created the same way by the sun. The sun heats the earth, which in turn heats the air above it. The warm air rises and cooler air moves in and takes its place. This movement is **wind**.

When the students have returned to their desks, tell them you want to experiment with heat one more way. Ask a volunteer from each group to bring up their powder. Ask: "What will happen if you sprinkle a small amount on the light? (**it should fly up**) The powder is carried up by the warm air. Let one person from each group try it at a time.

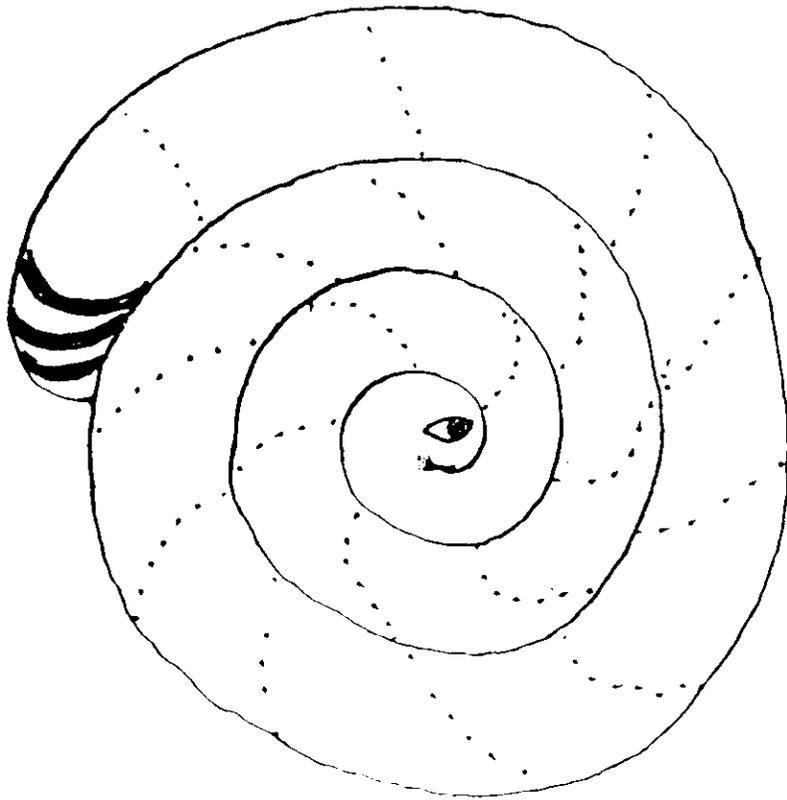


Closure

Tell the students: "Whisper to your neighbor the name of one source of energy. Show your neighbor what friction is. Tell your neighbor what form of energy friction creates."

Clean Up

Have students hand in tubs.



Snake

Pass It On

Grades 2-3

Overview

As a whole group the students will observe energy being transferred from one thing to another. The students will explore energy by doing the Flick a Nickel Trick and building Mini-Movies and Spinners.

Objectives

- To help students understand that energy can be used in many ways.
- To help students understand that energy can't be destroyed. When something loses energy, it is either transferred to something else or changed into another kind of energy.

Materials

For the presenter:

- 7 nickels
- a sample of a Mini-movie & a Spinner (see pages 2 & 3)

For each pair of students:

- 7 checkers or nickels in a plastic sandwich bag

For each student:

- Two copies - 2" circles
- One - 3x5 recipe card
- 1 pencil
- crayons or markers
- 1 piece of string - 26 inches long
- 1 piece of sturdy cardboard - 3" x 3"
- scotch tape

Getting Ready

Activity 1

The whole group activity needs to be set up in an area where all the students are able to see. A large table that everyone could gather around would work well. Put seven nickels or checkers into each plastic sandwich bag. You will need one bag/checkers or nickels for each pair of students.

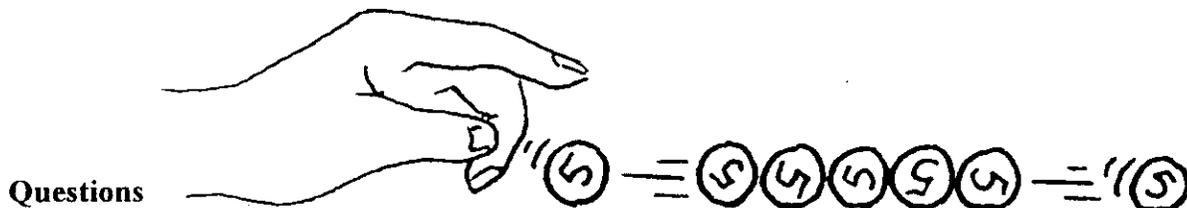
Activity 2

Draw 2 - 2 inch circles on a piece of paper. Run enough copies of the circles so each student has 1 copy of 2 circles. Put circles, cardboard, recipe cards, tape and string on a table that can be easily accessed by students. Make a sample of a Mini-Movie and a Spinner for demonstration.

Procedures

Activity 1: Flick the Nickel Trick

This activity is to be used as an introduction to energy. Use the trick and questions to get the kids thinking and spark their interest in energy. Begin by telling the students that today you are going to show them a trick called *Flick the Nickel*. As they watch you do it, ask them if they can figure out what caused the nickels to move. Line up six nickels on a table with a smooth surface. It is important that they are in a straight row and touching. Take the seventh nickel and put it about 2 nickel lengths away from the row of nickels. With your thumb and second finger, flick the seventh nickel at the row of nickels. When it hits the row it should cause the end nickel to move while the others remain in a row. Do this activity a couple more times, asking students to be the flickers. (Checkers are easier to use than nickels)



“What caused the seventh nickel to move? (*you flicked it with you finger*) Where did it get the *energy* to move? (*from you*) How did the first nickel move? (*When the first nickel hit the row of nickels they each passed on the energy to the last nickel and made it move.*) Do nickels have energy? (*no*) Then how can they move?” (*you passed your energy to them*) As soon as a student uses the word *energy*, write it on the chalkboard where you can refer back to it. Introduce the word to the students, if they don’t bring it up.

Have students return to their desks. Give each pair of students a bag with seven checkers or nickels to try the experiment for themselves. As you move around the classroom ask the student what they have observed. "Can you try flicking two nickels at once? Does it change what happens to the first nickel? Where are your nickels getting their energy?"

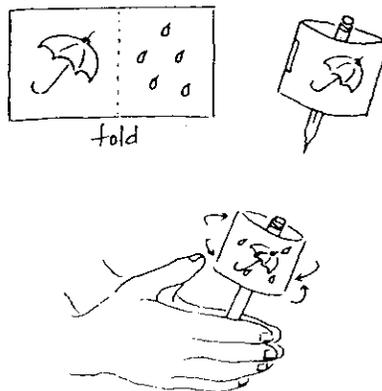
Before starting Activity 2, collect the bags of nickels or checkers.

Activity 2: Mini-Movies & Spinners

Tell the students that they are going to have a chance to make two different types of toys, a Mini-Movie and a Spinner, that also use energy that is passed on. They are called *thaumatropes* (*THO-ma-tropes*). Write the word on the chalkboard. Explain that they were toys that were made during the 1800's. They let you see an object that is out of sight. An old-fashioned thaumatrope is usually just a round piece of cardboard with pictures on both sides. When the card is spun, both pictures blend into one. Your eye holds onto the first image for a split second after it's gone. By the time the second picture is in sight, you seem to see the first picture on the second picture. This is what happens when you go to the movies. Use your samples to demonstrate how the Mini-Movie and Spinner work. Before handing out any materials, show the students how to make their own Mini Movies & Spinners. using the directions below.

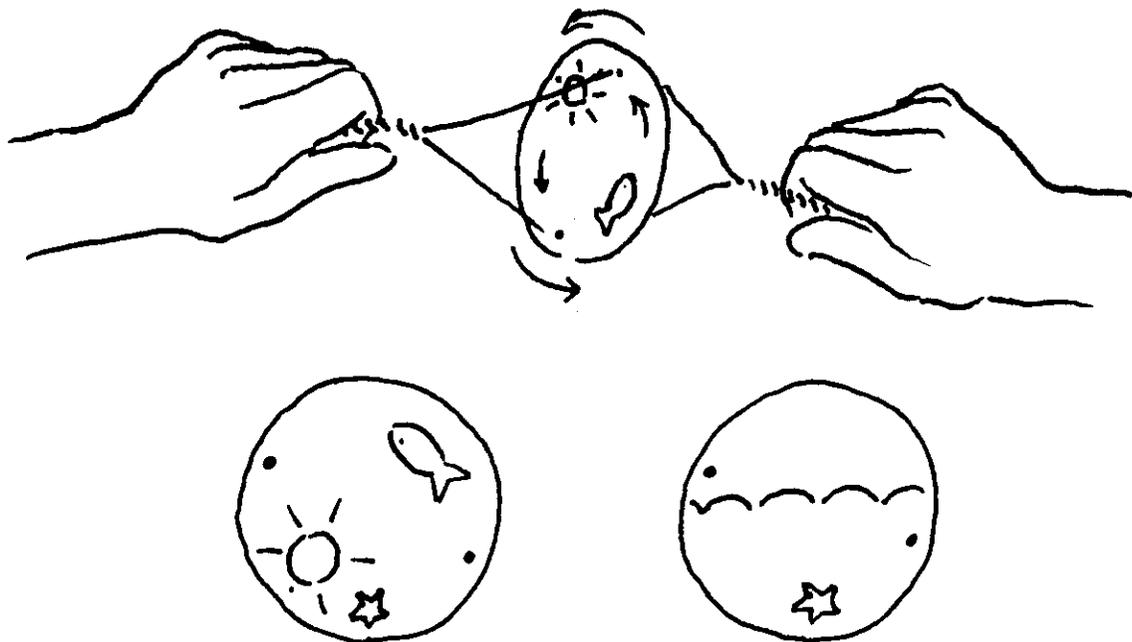
Mini Movies

1. Take a 3x5 index card and fold it in half.
2. Draw a different picture on each side. You will want to choose two simple things that go together. An example would be a lion & a cage or an umbrella & rain coming down.
3. Tape your pencil on the back side and in the center of one picture.
4. Now tape your card together on the side opposite the fold, so your pencil is inside the card. You have completed the thaumatrope!
5. Spin the thaumatrope by rolling the pencil between you hands.



Spinners

1. Cut out the two paper circles. Trace one circle on stiff cardboard and cut it out.
2. Think of two simple pictures that would make a colorful thaumatrope like you did on the Mini Movie. Draw one picture on the first paper circle and the other on the second paper circle. Make sure that the * (stars) are at the top of both pictures.
3. Glue the paper circles on opposite sides of the cardboard circle. Make sure that the dots and stars are opposite each other. Punch a hole where each dot is located. You may need to help the student with this so the circles don't rip.
4. Thread string through the holes. Tie the two ends of the string together.
5. Twirl the string with you fingers; once the string gets wound up, pull out on the string and the disk will spin. As this happens your movie will appear.



Hand out the materials to the students. As they are working, walk around the classroom and offer any help that is needed. Ask questions about their observations when they make their toys spin. “Where is it getting its energy from? What happens if you use more energy and move your hands faster? Do your toys have energy of their own or do they get it from somewhere else? Can you think of any other toys that may get their energy from somewhere other than people?” (*toys operated by batteries, wind-up cars, electric trains*)

Closure

Have each student hold up and demonstrate one of their finished toys. Ask the students: “Where does your Mini-Movie or Spinner get the energy to move? Can people pass their energy to an object and cause it to move?”

Clean Up

Each child is responsible for picking up their scraps and cleaning off their workspace.