

# Pre-Show

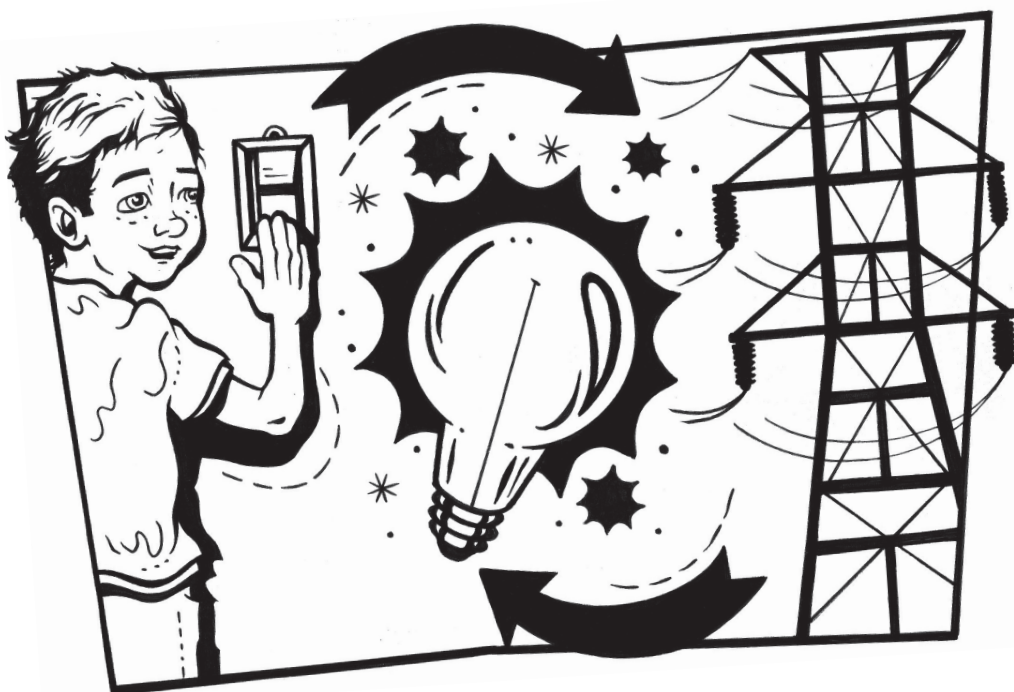
# ENERGY

## *ABOUT THE SHOW*

Energy is around us all the time – but what is it? Energy is the ability to do work, which can be anything from eating an apple to lighting a fire.

The Energy Show will introduce students to the different kinds of energy and demonstrate how we can transform energy from one type to another. We will explore how energy powers everything from complicated electrical grids to our own bodies. Finally, we will end the show with a powerful demonstration sure to energize your students!

We have provided the following activities to help students preview some of the major concepts covered in our show. Please remember to use appropriate safety measures for all activities. Adults should always supervise students during experiments.



**Thank you for scheduling a Franklin Institute  
Traveling Science Show.  
We are excited to visit you soon!**

# GOOD VIBRATIONS

FOR GRADES 1-5

As we will discover during the show, sound is a form of energy transmitted by waves. In this activity, students will create a drum and demonstrate how vibrations produce sound.

## EQUIPMENT

*Small coffee can*

*Large balloon*

*Rubber band or tape*

*Salt*

*Drumstick or pencil*

## PROCEDURE

1. Cut off the neck of the balloon, and stretch the balloon flat over the open end of the small coffee can. Secure with rubber bands or tape.
2. Sprinkle some salt across the balloon.
3. Tap the balloon softly with the drumstick or pencil. What do you hear? What happens to the salt? How does the movement of the salt illustrate how sound is made?
4. Experiment to see how you can change the volume or the pitch.
5. Invent your own instrument. Use common household materials (such as string, rubber bands, straws, plastic spoon, or a metal coat hanger) to create a musical instrument. Share how it works, and how you can change the sound.



## TYPES OF ENERGY

**Energy is the ability to do work.**

**Mechanical** – the energy of motion or position

**Potential** – the stored energy of position

**Gravitational** – potential energy due to gravity

**Elastic** – the energy stored in elastic materials as a result of stretching or compressing

**Kinetic** – the energy of motion

**Thermal** – the energy related to or caused by heat

**Electric** – the energy associated with electric charges and their movements

**Magnetic** – the energy based on a magnetic field

**Electromagnetic** – wave energy that is a combination of electric and magnetic energy

**Chemical** – energy released in a chemical reaction (such as burning wood, coal, or oil)

**Nuclear** – the energy that comes from splitting atoms of reactive material (such as uranium)

# DIMINISHING RETURNS

FOR GRADES 1-3

This activity introduces potential energy, kinetic energy, and energy transfer through a familiar scene: bouncing balls. After conducting a simple experiment, students will be able to describe how a ball reaches lower and lower heights on each consecutive bounce. In the upcoming show, we will explain why this occurs and how it demonstrates energy transfer.

## EQUIPMENT

*Large sheet of butcher or chart paper*

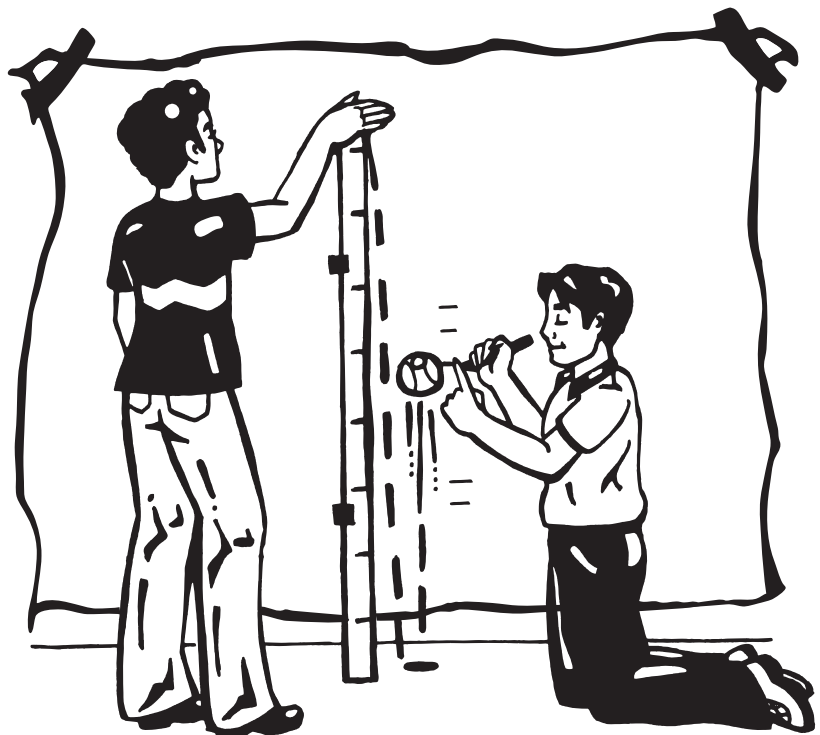
*Yard-stick*

*Variety of balls, such as: rubber balls, basketballs, tennis balls, baseballs*

*Markers*

## PROCEDURE

1. Tape the paper to a wall so that the bottom edge lies just above the floor. Hold the yard-stick upright in front of the paper, so the bottom is resting on the floor.
2. Examine the balls. Predict what will happen when you drop each one. Which ones will bounce and which ones won't? Which will bounce the highest?
3. Pick a ball. Hold the ball at the top of the yard-stick, and then release it.
4. Watch the ball bounce in front of the yard-stick. Observe the height it reaches on each bounce, and count the total number of bounces. Then use a marker to record the height of each bounce.
5. Repeat with another ball, and use a marker of another color to record the height of each bounce.
6. After you have tested all the balls, compare the results. Did any ball reach the top of the yard-stick, where it was dropped from? What happened to the height on each subsequent bounce? Which balls bounced the best? Why?



# MAKING WAVES

FOR GRADES 4-8

Light, sound, and electromagnetic energy all travel as waves, but each is a different kind of wave. In this activity, students will create and compare several types of waves. Through discussion, students will learn that although different waves have unique patterns, all waves share some important properties. We will explore waves in more depth during the Energy show.

## EQUIPMENT

*Large cake pan or other container*

*Water*

*Cork*

*String*

*Bow or bright ribbon*

*Slinky*

*Dominoes*

## PROCEDURE

1. Ask, "What is a wave? What are some examples of waves?"
2. Fill the cake pan with water.  
Place a cork in the water.  
Drop a pebble or other small object into the water. What happens to the cork? Does it move along with the wave? Observe what happens when the waves reach the container walls. How is this similar to a sound echo?
3. Have two students hold the string with some slack. Tie a bow or brightly colored ribbon near the middle of the string. One student will hold his or her end still, while the other student shakes the other end. How does the bow move? How can you change the shape or size of the wave?
4. Have two students hold a Slinky, stretched out. You may wish to tie the bow onto one ring of the Slinky. One student will hold his or her end still, while the other student plucks the first ring on the other end. How does this wave move? Does the bow move forward, or up and down?
5. Take 10 dominoes and line them up on end in a straight row. Then push over the first domino, so that all the dominoes fall in a chain reaction. What is moving along the wave – a domino or a pulse of energy? How is this like a sound wave?

