

EXPLORING ENERGY

THIRD - FIFTH

TEKS

| | |
|----------------------|------------------------------|
| <i>Third Grade:</i> | 3.5A, 3.5B, 3.5C, 3.6A |
| <i>Fourth Grade:</i> | 4.5A, 4.5B, 4.6A, 4.6B, 4.6C |
| <i>Fifth Grade:</i> | 5.5A, 5.6A, 5.6B |

Vocabulary

conductor, convection, conversions, electrical, energy, heat, insulator, kinetic, light, mechanical, potential, sound, thermal, vibrations

Pre-Show Activity

Pre-Show Lesson: What Is Energy

Post this question on the board: "What is Energy?"

Materials:

| | |
|--------------------|---|
| Mechanical Center: | yoyo, toy cars, cloth, plastic board, wood board, variety of balls |
| Light Center: | small mirrors, clay, bullseye picture |
| Thermal Center: | candle, beaker of water, red colored candy, matches or lighter |
| Sound Center: | variety of rubber bands and cups |
| Electrical Center: | battery, bulb and wire or Christmas tree light, miscellaneous items, such as coins, buttons, paperclips, erasers, plastic caps, rubber bands, paper, foil, paper towels, etc. |
| Chemical Center: | baking soda, vinegar, sandwich bags, tissues |

Procedure:

1. Take a blown up balloon and let it fly across the room. Ask students: “What did the balloon need to get from here to there?”, “What is energy?”, “What types of energy were at work in the balloon?”
2. Tell students that today, they are going to be exploring energy. Ask them what types of energy they know of. List these on the board. Tell students that today they are exploring mechanical, light, thermal, electrical, sound and chemical energies. Tell them to think about what makes all of these energies. What is energy?
3. Students should set up their notebooks. They should divide 3 pages of paper in half so that there are a total of 6 halves. Put titles on each square: 1. mechanical, 2. light, 3. thermal, 4. electrical, 5. sound, and 6. chemical. This is where they will show their work for each center.
4. Students will rotate through the energy centers in small groups (Appendix A-1). You will need to be stationed at the thermal energy center for safety reasons. You should light all matches. Students should not be handling an open flame. Students should take notes for each center in their science notebooks.

Post-Show Enrichment Activities

Activity One: Conductor or Insulator?

Materials: plastic spoon, wooden pencil, glass test tube, metal spoon, wax candle, aluminum foil, cardboard strip, battery, bulb, wire, warm water

Procedure:

1. Students will test the following objects to see if they are conductors of electricity, heat and sound: plastic spoon, wooden pencil, glass test tube, metal spoon, wax candle, aluminum foil, and a cardboard strip. You will want to find examples to test that are about the same size. You can shape the foil into the size of the other objects.
2. In order to test for conductivity, students will need a battery, bulb and wire (or Christmas tree light). They will test the objects one by one and record their results in the chart (Appendix A-2).
3. To test for heat, students will need a fairly warm cup of water (caution: do not get the water too hot or they can burn themselves). Place the objects in the warm cup of water and feel the tops of the objects to see if the heat has transferred up the object through conduction. This may be a little difficult to tell, but they should get the idea that metals conduct heat the best.
4. Finally, they will test for sound by hitting the object against a hard surface and listening for the vibrations.
5. They will record all answers in their chart. Using what they have learned, they will make predictions on the bottom half of the chart.

Activity Two: Will the Best Cup Please Stand Up!

Materials:

Per group: various types of cups, soup can, glass cup, thermometer, warm water

Procedure:

1. Gather cups from different restaurants. You will want to make sure that you have a Styrofoam cup, plastic cup, and paper cup. You will need one cup per group. Each group will also need a clean, empty soup can and a glass cup. Groups will need as many thermometers as they have cups.

2. Pour 100 ml of warm water in each cup.
3. Students will make a chart in which they will record the temperatures of the water in each cup over the next eight minutes (Appendix A-3). Students will then create a list rating the cups from best insulator to worst.

Activity Three: Conductors and Insulators in our World

Procedure:

1. Students will work in groups to create lists of real world examples of how we use products by their ability to insulate or to conduct. Examples: coolers, insulation in housing, metal pans conduct heat in order to cook, etc.

Activity Four: Energy Conversions

Materials: magazines

Procedure:

1. Students will cut out pictures that show examples of energy from magazines. These can be pictures of any living thing or non-living thing that is doing work.
2. Have students sort their pictures under the types of energy: mechanical, light, thermal, sound, chemical, electrical. Leave these energy types up on the board for the remainder of class.
3. Take a picture and hold it up in front of the class. For example, a boy skateboarding (Appendix A-4).
4. Draw a line on the board, and attach the picture to the end of the line. Now trace the energy back to the original source. You are working backwards. The original source should be at the front of the line. It is usually the sun. See example in Appendix A-5.
5. Students will work with a partner to complete as many energy conversion timelines like the one modeled in class as possible in the allotted time. They will use their pictures that they have collected as an end point.
6. Students will then go back and label the type of energy that is being used at each step in their energy conversion timelines (Appendix A-5).

Appendix

A-1

Station 1: Mechanical Energy (Motion)

1. Push a toy car and let it go. Try pushing it on different surfaces (cloth, plastic, wood). Is there a difference? Why?
2. Wind up the yo-yo, release it. See how far it comes back up.
3. Drop each ball. How are they alike? How are they different?
4. These demonstrate potential (stored) energy, and kinetic (motion) energy.

Draw a picture of one or more of the above activities and explain where the energy is coming from and where it is going? What is the original source of energy? Where did the energy go?

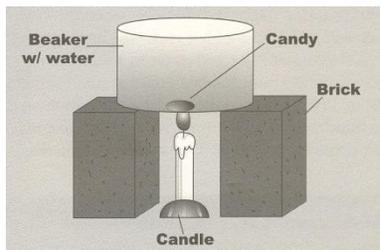
Station 2: Light Energy

1. Set the small mirrors in lumps of clay so they stand upright.
2. Secure the bullseye to the nearby wall.
3. Position the mirrors on the desktop so that you can bounce the light from the flashlight off as many mirrors as possible and reach the bullseye.

Draw a picture of your set up. Notice how the light travels. Use arrows to show this in your picture.

Station 3: Thermal Energy (Heat)

1. Put one piece of colorful (red) candy in the bottom of a beaker filled with water.
2. Heat the water with a candle.
3. Observe the convection current.



from JASON XII Hawai'i

Questions:

- 1) What causes the water to rise?
- 2) How is this similar to the air in your house?
- 3) How does this relate to wind?
- 4) Why is heat a type of energy?

Station 4: Electrical Energy

1. Using a battery wire and bulb (or Christmas tree light) test the items to see which ones allow electricity to flow through them. (coins, buttons, paperclips, eraser, plastic cap, rubber band, paper, foil, paper towel, etc.)
2. Make a chart to show which items allow electricity to pass through and which items do not.

What do all the items that allowed electricity to pass through have in common. Check other items around the room and see if they follow this rule.

Station 5: Sound Energy

1. Place a rubber band around a plastic, glass or Styrofoam cup so that it stretches across the opening of the cup.
2. Pluck the rubber band. What is the rubber band doing?
3. Test different types of cups, different sizes of cups, different thicknesses of rubber bands. How are they alike? How are they different?
4. Try to play a song using the rubber band and cup.

What happens if you put a hand on the rubber band to stop it from moving? Why does this happen? What has to happen for sound to occur? How can you make the sound a higher pitch? Lower pitch? Louder? Softer?

Station 6: Chemical Energy

1. Put a tablespoon of baking soda in a piece of tissue paper and wrap it up.
2. Put 50 ml of vinegar in a plastic sandwich bag.
3. Add the tissue paper of baking soda and seal it tightly.
4. Feel the bag and observe what happens. Did you hear anything?

A chemical reaction occurred between the baking soda and the vinegar. What changes occurred? How is this considered chemical energy? What kinds of energy were released during the reaction? List the ways that you rely on chemical energy every day (hint: photosynthesis and digestion).

A-2

Name _____ Date _____

| | Conductor or Insulator??? | | | |
|-----------------|----------------------------------|-------------|--------------|------------------------|
| | electricity | heat | sound | Is it magnetic? |
| plastic spoon | | | | |
| wooden pencil | | | | |
| glass test tube | | | | |
| metal spoon | | | | |
| wax candle | | | | |
| aluminum foil | | | | |
| cardboard strip | | | | |

Based on your test results, classify the following objects as conductors or insulators of electricity, heat and sound. Briefly explain your prediction.

| | Conductor or Insulator??? | | | |
|----------------|----------------------------------|-------------|--------------|----------------|
| | | | | |
| | electricity | heat | sound | Explain |
| staples | | | | |
| crayons | | | | |
| soda can | | | | |
| bicycle tires | | | | |
| popsicle stick | | | | |
| drinking glass | | | | |
| baseball | | | | |
| hair ribbon | | | | |
| keys | | | | |
| milk carton | | | | |

Why are electrical wires wrapped with plastic?

A-3

Will the Best Cup Please Stand Up!

| Cup | 1 min | 2 min. | 3 min. | 4 min. | 5 min. | 6 min. | 7 min. | 8 min. |
|-----------|-------|--------|--------|--------|--------|--------|--------|--------|
| Styrofoam | | | | | | | | |
| Plastic | | | | | | | | |
| Metal | | | | | | | | |
| Paper | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

A-4



Source: Kidprintables.com

A-5

