CURRICULUM GUIDE

Kindergarten through GRADE 2

JEFF BOYER PRODUCTIONS *presents*

FUN *with* ENERGY

Extending "Fun With Energy" In Your Classroom

Meets Next Generation Science Standards

This study guide is meant to build on the enthusiasm and curiosity of your students about energy in all its forms after watching or participating in the "Fun With Energy" presentation.

These activities are fun and engaging and can act as an introduction to the scientific principles they demonstrate. They also meet Next Generation Science Standards for each grade level.

ACTIVITIES FOR KINDERGARTEN

FORCES AND INTERACTIONS: PUSHES AND PULLS

Next Generation Science Standards

K-PS2-1	Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. Examples: Add a string to object, push object, stop a rolling ball, 2 objects collide and push each other.
PS3.C A	A bigger push or pull makes things speed up or slow down more quickly.

ACTIVITY 1 - PUSHES AND PULLS

Process

Explain that energy is what makes things move. When you push or pull an object, you can make it move. The amount of energy when you push or pull makes the object move fast or slow. Gather objects of various sizes and weights. Have children investigate pushing and pulling the objects and compare the effects of bigger pushes and pulls on the speed of the objects as they move and slow down.

Demonstrate

Make one ball roll into a stationary ball and push it.

Ask & Discuss

Why did the second ball move? Explain how the energy from the rolling ball moved into the second ball and made it move.

ACTIVITY 1 MATERIALS

Objects of various sizes and weights including marbles, balls, etc.

DEMONSTRATIONS OF DIFFERENT TYPES OF ENERGY

ACTIVITY 2 - MOVING AIR OR WIND ENERGY

Process

Have children experience making something move with their breath.

Demonstrate

Blow air to spin a pinwheel, blow through a straw to make paper clips move, blow on toy boat in water.

Ask & Discuss

- Is our breath when we blow on something a kind of energy? How do you know?
  Answer: It makes things move.
- What happens when the wind blows? What do you see?
  Answer: Wind makes leaves, branches, papers, objects move.
- How do we know that wind is a kind of energy?
  Answer: It makes things move.
- Discuss wind energy; show pictures of old-fashioned and modern windmills

ACTIVITY 2 MATERIALS

Pinwheel
– OR –
Straw and paper clips
– OR –
Toy boat in a tub of water

ACTIVITY 3 - MECHANICAL ENERGY

Demonstrate

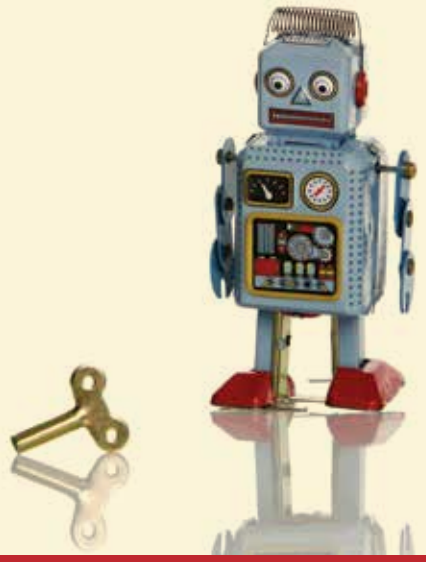
Have children examine various wind-up toys.

Ask & Discuss

- When you turn the key on the toy, your movements put energy into a spring inside the toy. What happens when you stop turning the key?
  Answer: The key starts to turn.
- What is making it move? Tell children to feel the toy. Help children discover that the spring is unwinding and making the toy move.
- Demonstrate or draw a diagram to show children that the stored-up energy inside the spring makes the key turn and the toy move.

ACTIVITY 3 MATERIALS

Wind-up toys



ACTIVITIES FOR GRADE 1

DEMONSTRATIONS OF DIFFERENT TYPES OF ENERGY

NOTE: See also demonstrations in the Kindergarten section

ACTIVITY 4 - KINETIC ENERGY + NEWTON'S FIRST LAW

Demonstrate

Have two children throw a ball back and forth.

Ask & Discuss

- What makes the ball fly through the air?
  Answer: Energy of motion.
- Where did the energy come from?
  Explain: The energy from your arm motion is the energythat keeps the ball moving.
- Why does the ball keep flying in the direction you throw it?
  Explain: A moving object keeps moving in the same direction until something stops it or changes its direction.
- What could stop the moving ball?
  Answers: Catching it, hitting something, losing energy because of friction or rubbing against air.

ACTIVITY 4 MATERIALS

Ball

WAVES: LIGHT AND SOUND

Next Generation Science Standards

1-PS4-1 Plan and conduct investigations to provide evidence that vibrating material can make sound and that sound can make materials vibrate.

Examples:
- Tuning forks and plucking a stretched string
- Hold a piece of paper near a speaker making sound
- Hold object near vibrating tuning fork

1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

Examples:
- Send signals with a flashlight, paper cup and string telephone
- Drumbeat patterns as messages

ACTIVITY 5 - SOUND ENERGY - DRUM SOUNDS

Demonstrate

Make a strong drum sound. Encourage children to feel how the top of the drum vibrates when hit.

- Then hit two drumsticks against each other and make sure children hear the sound and feel the vibration. Remind children that things that vibrate make sound.
- Take one drumstick in each hand and place the left stick on the drum surface. Hold it in place on the drum. Then raise the right drumstick and hit the left stick in its center. The children should hear a drum sound clearly.

  Explain: Energy can move from one object into another. When the right drumstick hit the left drumstick, the motion energy moved from the right to the left stick. The left stick began to vibrate. Because the left stick was on the top of the drum, the energy kept moving into the drum. It made the drum top vibrate and created a sound you can hear.

ACTIVITY 5 MATERIALS

A drum or any container with top that vibrates

Drumsticks or two wooden spoons

LIGHT/SOLAR ENERGY

Next Generation Science Standards

PS1.A Structure and Properties of Matter

2-LS2-1 Plants depend on water and light to grow.

ACTIVITY 6 - PLANTS USE LIGHT ENERGY

Demonstrate

Use a rosemary or other full-sun plant to demonstrate the power of solar energy.

Begin with a small plant or with seeds in one or more pots and leave in a sunny window.

As the plant grows, explain that the plant uses sunlight to make the food it needs to grow. The plant uses light energy to turn air and water into food it can "eat."

For information on growing rosemary, see www.gardeningknowhow.com/edible/herbs/rosemary/rosemary-grown-in-containers.htm

ACTIVITIES FOR GRADE 2

STATIC ELECTRICAL ENERGY

Next Generation Science Standards

PS1.A Structure and Properties of Matter

2-PS1-2/3 Different properties are suited to different purposes.

Explain that static electricity is made when positive (+) or negative (-) energy gathers on the surface of an object. You can create static electricity by rubbing some materials together.

ACTIVITY 7 - STATIC ELECTRICITY

Demonstrate

Rub the first and then the second balloon against the wool. Now, try to move the balloons toward each other.

Ask & Discuss

- What is happening?
  Why can't you make the balloons touch?
  Explain: The balloons both have a negative charge so they pull away from each other.

Demonstrate

Rub one balloon back and forth on your hair and then slowly pull the balloon away.

Ask & Discuss

- Why is my hair standing on end?
  Explain: Your hair has a positive charge and the balloon has a negative charge, so the hair, which is lighter, moves toward the balloon. This is called attraction.

Demonstrate

Place an aluminum can on its side on a flat surface. Rub a balloon on your hair again and hold balloon near the can. Demonstrate how the can follows the movements of the balloon.

Ask & Discuss

- Why does the can move with the balloon"?
  Explain: Positive and negative charges attract each other.

Research

Form children into small groups to find information on lightning on the Internet. A good source is: Weather Wix Kids at www.weatherwizkids.com/weather-lightning.htm

Guide a class discussion on how lightning forms in thunderstorms and the different kinds of lightning.

ACTIVITY 7 MATERIALS

Wool sock or sweater

2 blown-up balloons with strings attached

Aluminum can