

Energy: Wild Stuff in the Universe

OVERVIEW:

In this activity, students will learn about the objects in space and that the one of those objects, the sun, is an invaluable source of energy. Students will explore the solar system by visiting a planetarium and creating a power point presentation on a celestial object by conducting research.

CONCEPTS:

National Science foundation Standards:

Standard D: Earth and Space Science (Earth in the Solar System)

- The solar system.
- Motions that explain such phenomena as the day, the year, phases of the moon, and eclipses.
- The sun as the major source of energy for phenomena on Earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Causes of seasons.

Benchmark 4: The Physical Setting

A: The Universe

- The sun is a medium-sized star located near the edge of a disk-shaped galaxy of stars, part of which can be seen as a glowing band of light that spans the sky on a very clear night. The universe contains many billions of galaxies, and each galaxy contains many billions of stars. To the naked eye, even the closest of these galaxies is no more than a dim, fuzzy spot.
- Nine planets of very different size, composition, and surface features move around the sun in nearly circular orbits. Some planets have a great variety of moons and even flat rings of rock and ice particles orbiting around them. Some of these planets and moons show evidence of geologic activity. The earth is orbited by one moon, many artificial satellites, and debris.

E: Energy Transformations

- Most of what goes on in the universe—from exploding stars and biological growth to the operation of machines and the motion of people—involves some form of energy being transformed into another. Energy in the form of heat is almost always one of the products of an energy transformation.
- Heat can be transferred through materials by the collision of atoms or across space by radiation. If the material is fluid, currents will be set up in it that aid the transfer of heat.

Benchmark 10: Historical Perspectives

A: Displacing the Earth from the Center of the Universe

- Telescopes reveal that there are many more stars in the night sky than are evident to the unaided eye, the surface of the moon has many craters and mountains, and the sun has dark spots, and Jupiter and some other planets have their own moons.

OBJECTIVES:

Students will:

- Define energy.
- Be familiar with how the sun produces energy.
- Name the planets in the Solar System
- Provide examples of different satellites in the Solar System

- Identify four different types of energy and provide examples of how it is used on Earth.
- “Cook” up some solar energy
- Create a Power Point Presentation on a celestial object

PROCEDURES:

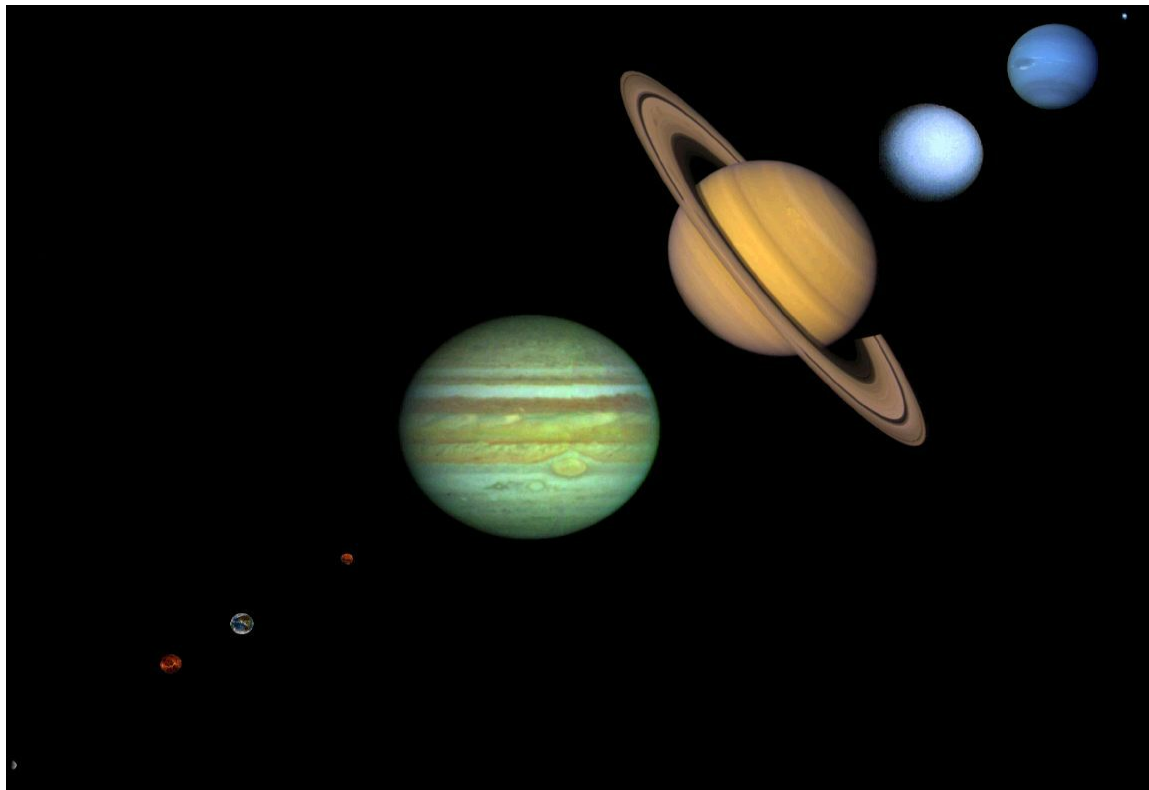
- Allow 3 hours to present the background information and to complete the activity
- Present the background information.
- Complete the activities (Part A.) “Identify the Planets, Power Point Presentation, and a trip to the planetarium.
- Follow up activity with discussion questions (see Part B.) These questions may be used for assessment purposes

MATERIALS:

- Background information
- Transparency (see picture at the end of the unit) or Poster of Solar system (without labels)
- Preplanned trip to a planetarium
- Computer
- Bowls (1 per group of 5 students)
- Aluminum foil
- Marshmallows
- Fork or skewer to hold marshmallow (1 per group of 5 students)

BACKGROUND:

Looking at the picture below, would you be able to identify what the planets in the picture are? How far apart do you think they are? This is a picture of the solar system.



The solar system consists of the Sun, the Nine Planets, more than 130 satellites of the planets and a large number of small bodies (comets and asteroids). **The solar system is divided into:** The **inner solar system**, which includes the Sun, Mercury, Venus, Earth and Mars. The **outer solar system**, which includes Jupiter, Saturn, Uranus, Neptune and Pluto There are numerous smaller bodies that inhabit the solar system, namely the satellites of the planets:

- **Asteroids** - small rocky bodies orbiting the Sun, mostly between Mars and Jupiter, but also everywhere.
- **Comets** – small icy bodies which come and go from the inner parts of the solar system.
- **The Sun:** A star (one of 100's of millions). It is 93 Million miles away, and is 870,000 miles around in circumference. You can fit 1 million earths inside the Sun. Planets move around the Sun in ellipses due to gravity
- **The Moon:** Formed at the same time as the earth. It revolves around the earth and rotates at the same speed. The phases of the moon we see are as a result of reflection of the Sun's light. When the earth gets in the way, then that causes the phases.
- **The Planets:** Their sizes are relative to each other. Jupiter, Neptune, and Uranus all have ring systems. Mars has lately been on everyone's mind, especially after the Spirit-Mars Rover landed. Saturn is a gas giant like Jupiter, but less dense than water.

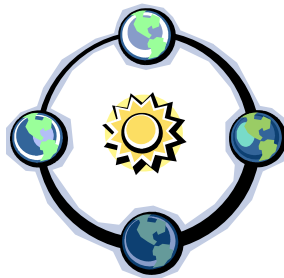
The Sun and Energy

Think of the ways we use energy in our everyday lives. We eat food, which gives us energy. This energy is stored in our body.

Types of Energy:

- **Potential Energy** – Stored energy
- **Kinetic Energy** – Energy in motion
- **Solar Energy**-Energy from the sun
- **Heat Energy**

Energy itself is neither created nor destroyed. Potential energy can be converted to kinetic energy and vice versa.



There is only one star in our solar system and that is the Sun. All the other stars are far outside our solar system. The Sun is the closest star to Earth and is the center of our solar system. The solar system consists of the Sun, the nine official planets, more than 130 satellites of the planets, and a large number of comets and asteroids. The sun has produced energy for billions of years. Solar energy is the radiation that reaches the earth. It can be converted directly or indirectly into other forms of energy, such as heat and electricity.

The sun is made up of gas: mostly hydrogen and helium. It is hot and big and a huge source of energy. The Sun's source of energy is not fire, but it comes from hydrogen and fusion (transforming hydrogen into helium). This is possible when two protons traveling in opposite directions crash into each other and form a large system. This process basically makes the sun a giant nuclear power generator.

The Sun is ultimately involved in providing the energy to light up your home or office. This is through hydroelectric power (electricity from water), which comes from the sun heating the earth and vapor rising up which in turn becomes rain.

Where does energy in KY come from? Most of the energy in KY is from coal, which is dug from the earth. It was formed by plant and animal fossils which died millions of years ago. The energy in the plants came from the Sun, through the process of photosynthesis.

ACTIVITY:

Part A:

Activity 1:

Show poster or transparency of the solar system. Provide time for students to name the planets.

Activity 2:

Field Trip to a near by Planetarium

Activity 3: Power Point Presentation

Design a power point presentation of a celestial object. Your presentation should have between 5-10 slides. Make sure to include accurate facts.

(Example: a planet, all of the planets, the sun, the moon, etc.)

Activity 4:

Let's Get Cooking

Collect solar energy and put it to use.

Procedure:

- Cover bowl with aluminum foil, making the foil as smooth as possible.
- Place the bowl into the sun, angling it if necessary so that the center of the bowl is receiving direct rays.
- Locate the "hot spot." The hot spot is where the sun's reflected rays criss-cross. To locate the hot spot, slowly put your open hand into the bowl until you feel the area that is the warmest.
- Put a marshmallow on the end of a long skewer and hold it in the hot spot.

What were some of the problems you encountered?

Part B:

Ask the following questions and allow time for discussion.

Share:

Share some major ideas relating to any of the planets.

Process:

How is the sun the major source of energy?

Generalize:

Why is the sun a good energy source? What are some problems with using solar energy?

Apply:

Name three different ways you use energy in your everyday life.

Transparency Master of the Solar System:

Directions: Identify the planets.

