Inquiry #1a - Matter

Purpose: What's the difference between matter and energy?

Background Information (vocabulary):

- Characteristic: a distinguishing trait, feature, or quality
- Energy: ability to do work (to make things move)
- Matter: anything that has mass and takes up space (volume)
- Property: a characteristic used to describe a substance

Reading:

Think of the world around you… Everywhere there are things – matter. You see, hear, smell, taste, and feel them. The world has many kinds of matter. There are water and rocks; wood and metal; plants and animals. Even the invisible air you breathe is matter. The list can go on and on.

The world also has **energy** – like light, heat, sound, motion, and electricity.

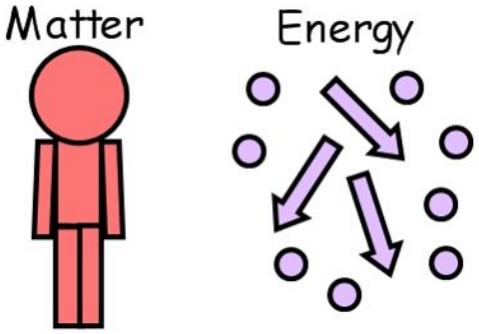
The entire universe is made up of matter and energy. THERE IS NOTHING ELSE!!

What are the differences between matter and energy?

MATTER

- Matter has mass.
- Matter takes up space (called volume).

Thus, matter is anything that has mass and takes up space.



ENERGY

- Energy is not like matter.
- Energy does not have mass.
- Energy does not take up space.
- Energy MOVES matter.

Therefore, energy is the ability to make things move.

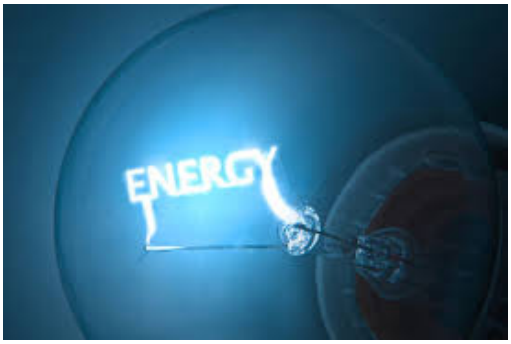
Light, heat, sound, motion, and electricity, are forms of energy. Why? Because they can make things move.

What are properties? Properties or characteristics are the special things that help us identify matter. You think about matter all the time. Is it red or is it blue? Is it heavy or is it light? What does it smell like?

Color, mass, and odor are three properties. There are many more.

Every kind of matter has its own properties. Some kinds of matter share properties. However, no two kinds of matter have all the same properties.

Inquiry #1b - Energy



Background Information (vocabulary):

- Energy is the ability to make things move.
- Energy can provide heat and light or to make machines work.
- Energy can be changed, or converted, from one form to another.

Reading:

Look around. How many things do you see moving? Is anyone asleep right now in science class? What makes something move? Why does a rowboat drift downstream? Why do fallen leaves fly around? What lifts a rocket off the ground? Why can you turn the page of a science inquiry?

Objects move because of energy. We say, therefore, that **energy** is the ability to make things move. Energy is not like matter. Matter has mass and takes up space. Energy has no mass and does not take up space.

There are seven main forms of energy:

I. CHEMICAL ENERGY - Chemical energy is what holds the atoms in molecules together. It can be released by chemical reactions like burning wood.

II. ELECTRICAL ENERGY - Electrical energy is the movement of electrons through matter. Electricity is a form of electrical energy.

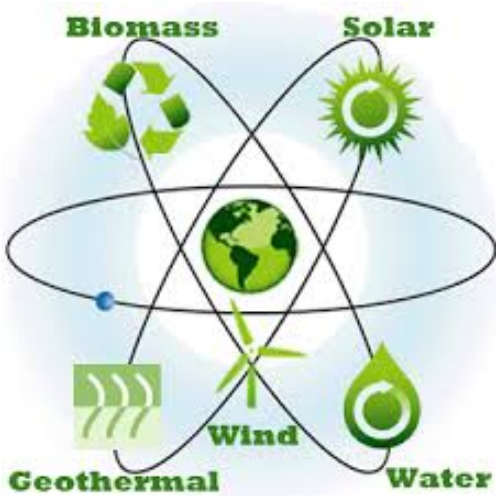
III. HEAT ENERGY – Heat energy is the random motion, or vibration, of atoms within matter. The faster the atoms vibrate, the more heat energy they have.

IV. LIGHT ENERGY – Light energy is the energy carried by light.

V. MECHANICAL ENERGY – Mechanical [Muh-KAN-i-kul] energy is the energy of moving things.

VI. NUCLEAR ENERGY – Nuclear [NEW-klee-ur] energy holds protons and neutrons together in the nucleus of atoms. This energy powers the sun and nuclear power plants.

VII. SOUND ENERGY – Sound energy vibrates air molecules. The vibrating molecules move tiny bones in your ear. The message of sound then moves to your brain. This is how you hear. Sound energy can also vibrate objects, like shattering a glass with a high-pitched tone.



The Law of Conservation of Energy states that energy can be changed, or converted, from one form to another, which you learned about last year in 6th grade. For example, the chemical energy in gasoline is changed into heat energy in the engine of a car. The heat energy is converted into mechanical energy to move the car.