

2013 is the International Year of the Mathematics of Planet Earth.

Our planet is the setting for dynamic processes of all sorts, including the geophysical processes in the mantle, the continents and the oceans, the atmospheric processes that determine our weather and climates, the biological processes involving living species and their interactions, and the human processes of finance, agriculture, water, transportation and energy.

Whether findings are directly from the mathematical sciences or from branches of chemistry, physics or biology, the chances are that some form of mathematics is used.

There are four international themes for the year:

- A PLANET TO DISCOVER
- A PLANET SUPPORTING LIFE
- A PLANET AT RISK
- A PLANET ORGANISED BY HUMANS

Let's get excited and proud of their mathematicians and scientists!

A PLANET ORGANISED BY HUMANS

ENERGY

Energy is everywhere! Without it we could not live, as we rely on it to move, grow, sleep and play. Although we cannot see it or feel it, we experience it in different forms, eg sound, heat and light. Other forms of energy include kinetic energy, chemical energy, electrical energy, nuclear energy, gravitational potential energy and elastic potential energy. When we start to use energy it becomes a power source.

The law of conservation of energy states that energy cannot be created or destroyed. It can only be transformed from one form to another. Or it can be transferred from one body to another; however, the total amount of energy remains the same.

WHAT IS ENERGY AND WHERE DOES IT COME FROM?

Whenever a push and pull makes something move, work is done. Scientists define energy as the ability to do work. The rate at which the work is done is called power.

Most of the energy on Earth comes from the Sun. Plants capture the energy of sunlight and use it to make food. Everything on Earth feeds on plants, or on plant-eating animals, and so the Sun's energy is passed along with each meal. When people and animals eat, the food reacts chemically with oxygen breathed in from the air and this releases energy.

Machines usually get their energy from oil or other fossil fuels. These fuels also react chemically with oxygen from the air, but the combustion is much faster than that of food in the body.

TYPES OF ENERGY

LIGHT ENERGY

All living things need light to survive. Plants need light to photosynthesise and animals need light to see. Light comes from many sources, the most important of which is the Sun. Other natural sources of light are the Moon and lightning.

SOUND ENERGY

Sound energy is the movement of energy through substances in waves. Sound is produced when a force causes an object or substance to vibrate. The energy is transferred through the object in a wave.

THERMAL ENERGY (HEAT ENERGY)

Thermal energy comes from heat. When a substance is heated, its particles gain energy and vibrate more vigorously. This is

kinetic energy acting on the particles. Take a cup of hot tea, for example. The tea has thermal energy. When you pour milk into your tea, some of the energy is transferred to the milk particles. The tea is cooler because it lost thermal energy to the milk.

CHEMICAL ENERGY

Chemical energy is energy stored in fuel (eg food) which is released when chemical reactions take place, often in the form of heat. Batteries, petrol, natural gas and coal are examples of stored chemical energy.

ELECTRICAL ENERGY

Electrical energy is transferred by an electric current. A battery transfers stored chemical energy as charged particles called electrons. These typically move through a wire to power an appliance. Lightning is a good example of electrical energy in nature.

KINETIC ENERGY

Kinetic energy is the energy of a moving object. All moving things have kinetic energy. It is energy possessed by an object due to its motion. The heavier the object and the faster it moves, the more kinetic energy it holds.

NUCLEAR ENERGY

Energy from uranium is called nuclear energy. Nuclear energy is stored in an atom's nucleus. Everything in the universe is made up of tiny particles called atoms. There is enormous energy in the bonds that hold atoms together. Uranium atoms can be made to split and release heat. This is harnessed to make steam and power is generated.

ELASTIC (STRAIN) POTENTIAL ENERGY

Elastic (Strain) Potential Energy is energy that is stored in an object that is being stretched, squashed or twisted. The energy is classed as potential energy as it will be transferred to another type of energy such as kinetic energy. By applying force to an elastic object (stretching it), energy transfers into the object. When this energy is released into its surroundings (letting go), the object can return to its original shape.

GRAVITATIONAL POTENTIAL ENERGY (GPE)

Gravitational Potential Energy (GPE) is the energy an object contains due to its position. Work is required to elevate objects due to Earth's gravity. Think of water kept behind a dam. If an object falls from one point to another, the force of gravity will do positive work on the object creating kinetic energy.

ENERGY QUIZ

After furthering your research on energy, take our quiz to see how much you now know. Download the *Energy Quiz* blackline master from the Teacher Toolkit. You can extend this activity by creating your own quiz and have your friends test their knowledge of energy.

MAKE A ROCKET BALLOON

Follow our instructions on creating your own rocket balloon, a fun exercise to demonstrate energy. Download the *Make a Rocket Balloon* blackline master from the Teacher Toolkit. Once you have completed the experiment, explain in your own words what happened and why.

WRITE AN EXPLANATION

Write an explanation as to why coal, oil and natural gas are referred to as 'fossil fuels'. HINT: Find out what they are

and how they are formed. Use the *Plan Your Explanation Writing* blackline master from the Teacher Toolkit to guide your writing process.

SAVING ENERGY IN OUR DAILY LIVES

Have you thought about the energy that you and your family use each day? Look at the ways your family lights your home, heats your home, cools your home, washes clothes, dries clothes and powers the car or cars. Then look at ways you could save energy in these areas. Download the *Saving Energy in Our Daily Lives* blackline master from the Teacher Toolkit.

RESOURCES AVAILABLE IN THE 2013 SCHOOL ESSENTIALS CATALOGUE

- *Helix 4-Piece Geometry Boxed Set*, page 174
- *Alternative Energies*, page 209
- *6-in-1 Educational Solar Kit*, page 209
- *Green Science Windmill Generator*, page 209
- *Alternative Fuels*, page 209
- *Energy Technology Charts*, page 210
- *Investigating Renewable Energy*, page 210
- *Enviro Battery Kit*, page 210
- *Science Readers Forces and Motion*, page 211
- *Simple Machines Set of 5*, page 212
- *Light-Up Ferris Wheel*, page 213
- *Go Facts: Physical Science*, page 213
- *Space Wonder Gyroscope*, page 217
- *Science Labs*, page 222
- *Alternative Energy/Renewable Resource Bulletin...Set*, page 226

FREE TEACHER TOOLKIT RESOURCES AVAILABLE AT WWW.SCHOLASTIC.CO.NZ/TOOLKIT

- *Laws of Motion* blackline master
- *Sunny Sundial* blackline master
- *Plan Your Explanation Writing* blackline master
- *Energy Quiz* blackline master
- *Make a Rocket Balloon* blackline master
- *Saving Energy in Our Daily Lives* blackline master
- *A Powerful Word Search* blackline master

VISIT:

www.scholastic.co.nz/toolkit to access supporting resources.