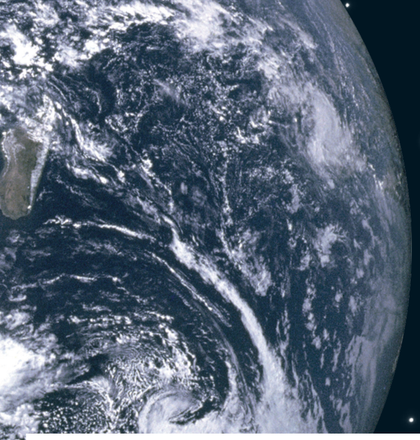

INSIDE EARTH

A study of Earth will increase students' understanding of our planet and the need for protecting the Earth's environment. It ties in to the National Science Curriculum for Lower Primary students.

BENEATH THE SURFACE OF THE EARTH

Geologists in the early 20th century studied the seismic waves caused by earthquakes to uncover what lies beneath the surface of the Earth. They found that the Earth's crust is a patchwork of twelve large tectonic plates, which slowly move and grind against each other. Over millions of years, these plates have pushed the Earth's surface upwards to create mountain ranges such as the Himalayas. Where these plates collide, earthquakes can occur.

Tectonic Plates

Activity—Download the *Earth's Tectonic Plates Experiment* blackline master from the Teacher Toolkit as a demonstration to students of the effect of this collision. Explain to students that Earth is constantly moving and spinning in space, and that the Earth's continents were formed by the constant shifting movements between the plates and the gaps that appeared between them. Oceans filled the spaces between the gaps. Take students out to a grassy area of the playground. Ask them to spin slowly in circles with arms outstretched. What do they notice?

Activity—Download the *Tectonic Plates Map of the World* blackline master from the Teacher Toolkit. Ask students to colour and label the different continents.

Volcanic Eruptions

Where the thin ocean crust is forced beneath the thicker continental crust, the rocks melt and form boiling hot magma. This creates pressure deep below the surface of the Earth and rises into the crust above, breaking the Earth's surface and causing volcanic eruptions.

Activity—Ask students to observe the effect of boiling water in a covered saucepan at home. Ask them to draw and write down their observations as homework and then to discuss their observations in class.

HOW IS THE EARTH FORMED?

The Earth was one of the planets formed from the collapse of the first star. As asteroids smashed into its surface, the Earth's temperature rose and it continued to get hotter and hotter and bigger and bigger. It was so hot it began to melt the metals in its rocks. These molten metals sank to the Earth's centre and formed the core. Lighter material rose to form the outer layer or crust. Over time, the Earth's crust began to cool and thicken, making it possible to support human, animal and plant life. (Use the example of a pie cooking in an oven to explain this concept to students. When the pie is taken out of the oven, the crust begins to cool and thicken, making it stronger and less likely to break when touched.) Beneath the core and the crust are layers of very hot molten rock.

A UNIQUE PLANET

Earth is believed to be the only planet with visible surface water. As over 70% of the Earth is ocean and water, from space the Earth appears as a beautiful blue globe spinning through the inky blackness of space. This is why it is referred to as the Blue Planet.

Earth's atmosphere is also unique in that it contains oxygen, which is essential for life. Earth also circles a star called the Sun, which provides the heat, light and precipitation we need to keep us, and Earth's animals and plants, alive.

At one time, a large asteroid may have collided with the planet, breaking off a large piece of it, which would eventually have become our Moon. However, there is still much, much more to be discovered about Earth!

THE EARTH'S MAGNETISM

The outer core and the inner core together cause the Earth's magnetism. As Earth rotates, the outer core spins but the inner core doesn't spin because it's solid. This gives a kind of dynamo effect and causes the Earth's magnetism. Magnetism has been used by sailors to navigate their way on the Earth's oceans for many thousands of years.

Activity—Using a set of magnets and iron filings, you can demonstrate to the class on a blank white piece of paper the effects of magnetism. Show how magnets can both attract and repel. Ask students to test the theory of magnetism themselves using a set of magnets and a collection of paperclips.

GRAVITY

What keeps us on the planet? If the Earth stopped spinning, would we all fall off? Are there any planets that do not spin?

We do not stay on the Earth because it is spinning, but because of the force of gravity. I am not aware of any planets that do not spin.
Dr Louis Barbier, November 2001

Gravity is the force that pulls little objects towards bigger objects. The bigger the object the more gravity it has. Gravity is the force that keeps us on the Earth's surface! It is gravity that attracted smaller rocks and dust to make smaller planets bigger. Much of the solar system was created by the effects of gravity and the Sun's gravity holds the Earth in its orbit.

Activities—Take students out into the playground to demonstrate the principles of gravity with these activities and experiments.

- What happens when students jump? What happens when a ball is thrown? From a height, drop different-sized balls. What do students notice? Ask them to record their results.
- Take as many buckets with handles as you can out to the playground. Three-quarter fill them with water. Ask students to predict what they think might happen if they were to swing the buckets around and then down again, keeping the speed and motion the same. Does the water stay in the bucket or spill out? Ask students to test their theories out. (Be prepared for some water spills with young children whose movements may be too slow or too jerky!) The water will stay inside the bucket due to the force of gravity that pulls the water to the centre of the Earth inside the bucket, and the centrifugal and centripetal forces that keep it there even when the bucket is upside down. This is the principle that keeps people from falling out of rollercoasters! Download the *Spinning Bucket Experiment* blackline master for students to complete.

ROCKS, ROCKS, ROCKS

To date, the oldest rocks ever found on Earth have been found in north-west Canada. These rocks have been dated by geologists as being four billion years old, providing us with an idea of how old the Earth is. There are three main types of rock that make up Earth:

Igneous Rocks—formed when molten rock cools and hardens. Igneous rocks on the surface are sometimes called volcanic rocks. Pumice is an example of an igneous rock. With a pumice stone or rock, show students the rough crevices or holes caused by the gas bubbles of the molten rock before it cooled.

Sedimentary Rocks—are the most common types of rock and are formed by the breaking down and weathering of other rocks. An example of a sedimentary rock is sandstone, or conglomerate, which is made up of lots of rock fragments.

Metamorphic Rocks—are made when rocks are changed from one type to another by extreme heat and pressure within the Earth's crust. Quartz, marble and slate are examples of metamorphic rocks.

Activity—Ask students to collect rock samples. Some students may already have rock collections which they can bring into the classroom. Display the rocks on a table and ask students if they can identify the different types of rock and whether they are igneous, sedimentary or metamorphic. Make labels for the rocks. Your local library or museums may have more information about different rocks in your local area.

REVISION

As a revision activity for this unit of work, download the *Earth Inside Cross-Section* blackline master and ask students to colour and label the different parts of Earth's interior.

RESOURCES

RESOURCES AVAILABLE IN THE 2012 SCHOOL ESSENTIALS CATALOGUE

- *Magic School Bus DVD Library*, page 151
- *Hands-On Science*, page 152
- *Early Years Themes: Science*, page 154
- *Complete Rock, Mineral & Fossils Collection*, page 157
- *Rocks & Minerals*, page 157
- *Everyday Uses Rock and Card Set*, page 157
- *Discover Science Readers Pack*, page 159
- *Erupting Volcano Model*, page 169
- *The Magic School Bus Blast Into Space 6-Pack*, page 172
- *Our Solar System: Bulletin Board*, page 172
- *Inflatable Solar System Set*, page 173
- *Science Vocabulary Readers: Space*, page 174
- *Giant Magnetic Solar System*, page 175

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

- *Earth's Tectonic Plates Experiment* blackline master
- *Tectonic Plates Map of the World* blackline master
- *Spinning Bucket Experiment* blackline master
- *Earth Inside Cross-Section* blackline master

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To access resources to support this poster visit www.scholastic.co.nz/schools/bookclub and click on Teacher Toolkit.