

# Shake, Rattle, and Roll: Understanding Plate Tectonics!

## Materials Needed for this Lesson:

- Hard-boiled egg (peeled)
- Knife (adult supervision required)
- Plate
- Clear glass beaker or heatproof container
- Water
- Food colouring (red or blue)
- Heat source (e.g., candle or small spirit burner - adult supervision crucial!)
- Small pieces of paper or a few dried herb flakes (e.g., oregano, thyme)
- World map showing tectonic plates (can be digital or printed)
- Pen/Pencil
- Worksheet (embedded below)

## Lesson Activities:

### Session 1: Earth's Layers & Introduction to Plates (15 minutes)

**Educator:** Welcome! Today, we're going to explore the amazing world under our feet – the world of plate tectonics! Do you know what the ground you're standing on is actually part of? It's part of a giant puzzle piece called a tectonic plate. Australia sits on its own plate, the Indo-Australian Plate!

#### Activity 1: The Edible Earth Model

1. Take your peeled hard-boiled egg. This egg represents the Earth.
2. Gently crack the shell all over, but try to keep the pieces together. These cracks represent the boundaries of the tectonic plates on Earth's crust. The shell itself is like the Earth's crust.
3. Carefully, with adult help, slice the egg in half. Observe the layers:
  - **The Shell (Crust):** The thin, brittle outer layer.
  - **The Egg White (Mantle):** The thickest layer, mostly solid but can flow very slowly. This is where convection currents happen.
  - **The Yolk (Core):** The very centre of the Earth, made of a liquid outer core and a solid inner core.
4. Discuss how these layers relate to the real Earth. The Earth's crust isn't one solid piece but broken into plates like the cracked eggshell.

### Session 2: What Makes the Plates Move? Convection Currents (15 minutes)

**Educator:** So, what makes these huge plates move? It's a process called convection, happening in the mantle (the egg white part of our model).

#### Activity 2: Convection Current Demonstration (Adult supervision essential for heat source)

1. Fill the clear beaker about two-thirds full with water.
2. Let the water settle. Then, carefully add a few drops of food colouring to one side at the bottom of the beaker. Try not to disturb the water too much.
3. (Adult only) Carefully and safely heat the water from below, directly under where you placed the

food colouring. Use a candle or a small burner. Ensure stability and safety precautions.

4. Observe what happens to the coloured water. You should see it rise as it heats up, then spread across the top, cool down, and sink on the other side, creating a circular motion.
5. Sprinkle a few tiny pieces of paper or herb flakes on the surface of the water. Watch how they are carried along by the current.

**Educator:** This movement is similar to what happens in the Earth's mantle. Hotter, less dense molten rock rises, cools, and then sinks, creating powerful currents that drag the tectonic plates above them, causing them to move!

### Session 3: Plate Boundaries & Australia's Neighbours (15 minutes)

**Educator:** When these plates move, they interact at their edges, called plate boundaries. There are three main types:

- **Divergent Boundaries:** Where plates pull apart (e.g., Mid-Atlantic Ridge). New crust is formed.
- **Convergent Boundaries:** Where plates collide. This can cause mountains (like the Himalayas), volcanoes, and earthquakes. The Pacific Ring of Fire, near Australia and New Zealand, is full of convergent boundaries, making it very geologically active. New Zealand experiences many earthquakes and has volcanoes because it sits right on a convergent boundary between the Pacific Plate and the Indo-Australian Plate.
- **Transform Boundaries:** Where plates slide past each other (e.g., San Andreas Fault in California). This causes earthquakes.

Look at your world map showing tectonic plates. Can you find the Indo-Australian Plate? Notice how it's interacting with the Pacific Plate near New Zealand and Papua New Guinea, leading to significant geological activity like earthquakes and volcanoes. While mainland Australia is relatively stable because it's in the middle of a plate, the edges are active!

### Session 4: Worksheet & Recap (15 minutes)

**Educator:** Now let's see what you've learned. Complete the short worksheet below.

#### Worksheet: Plate Tectonics Quick Check

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

#### Part 1: Label the Earth's Layers (Imagine a cross-section like the egg)

1. Outermost thin layer: \_\_\_\_\_
2. Thick middle layer where convection occurs: \_\_\_\_\_
3. Innermost layer: \_\_\_\_\_

#### Part 2: Fill in the Blanks

1. The theory that explains the movement of Earth's giant land pieces is called \_\_\_\_\_.
2. The Earth's crust is broken into many large and small \_\_\_\_\_.
3. The main driving force behind plate movement is \_\_\_\_\_ currents in the \_\_\_\_\_.
4. When two plates collide, it's called a \_\_\_\_\_ boundary.
5. Australia sits on the \_\_\_\_\_ - \_\_\_\_\_ Plate.

6. An area with many volcanoes and earthquakes near Australia and New Zealand is the Pacific Ring of \_\_\_\_\_.

**Part 3: Short Answer**

1. Briefly explain why New Zealand experiences more earthquakes than mainland Australia, using what you've learned about plate tectonics.
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**Educator:** Great job today! Plate tectonics is a fundamental concept in understanding our dynamic Earth. It explains so much, from mountain ranges to earthquakes and even the distribution of some fossils!