THE LEARNING WALL

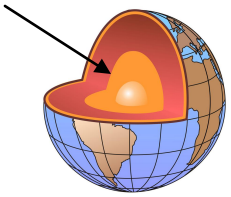
EARTH SCIENCE - Rocks and More

The Science Concept Learning Bricks packets are organized by the branches of science. Within each branch, we have organized the concepts into categories, this particular packet is Earth Science – Rocks and More. The bricks are listed alphabetically within each packet, with each concept explanation (concept, question, answer, gesture, and examples) listed first and the Concept Learning Brick visual listed behind the explanation. This section contains **20** Concept Learning Bricks. Please refer to The Learning Wall Introduction and Explanation at www.PEPnonprofit.org for details on how to implement these items in your classroom.

Rocks and More

core, crust, deposition, earthquake, epicenter, erosion, fault line, fossil, igneous rock, mantle, metamorphic rock, mineral, pangea, plate tectonics, rock cycle, sedimentary rock, soil, volcano, weathering – chemical, weathering – physical

Core



Question: What is the core of Earth?

Answer: The core of Earth is the central part of the earth below the mantle, beginning at a depth of about 1,800 miles. It is made up of a liquid outer core and a solid inner core and makes up 30% of the Earth's mass.

Gesture: Hold both hands together to form a sphere. Open your hands and pretend to pull out the core in the middle.

Examples: Have students build a cutaway, to scale, model of the Earth using a Styrofoam ball. Have students cut away a quarter of the ball and use markers to color in each layer (crust, mantle, core).

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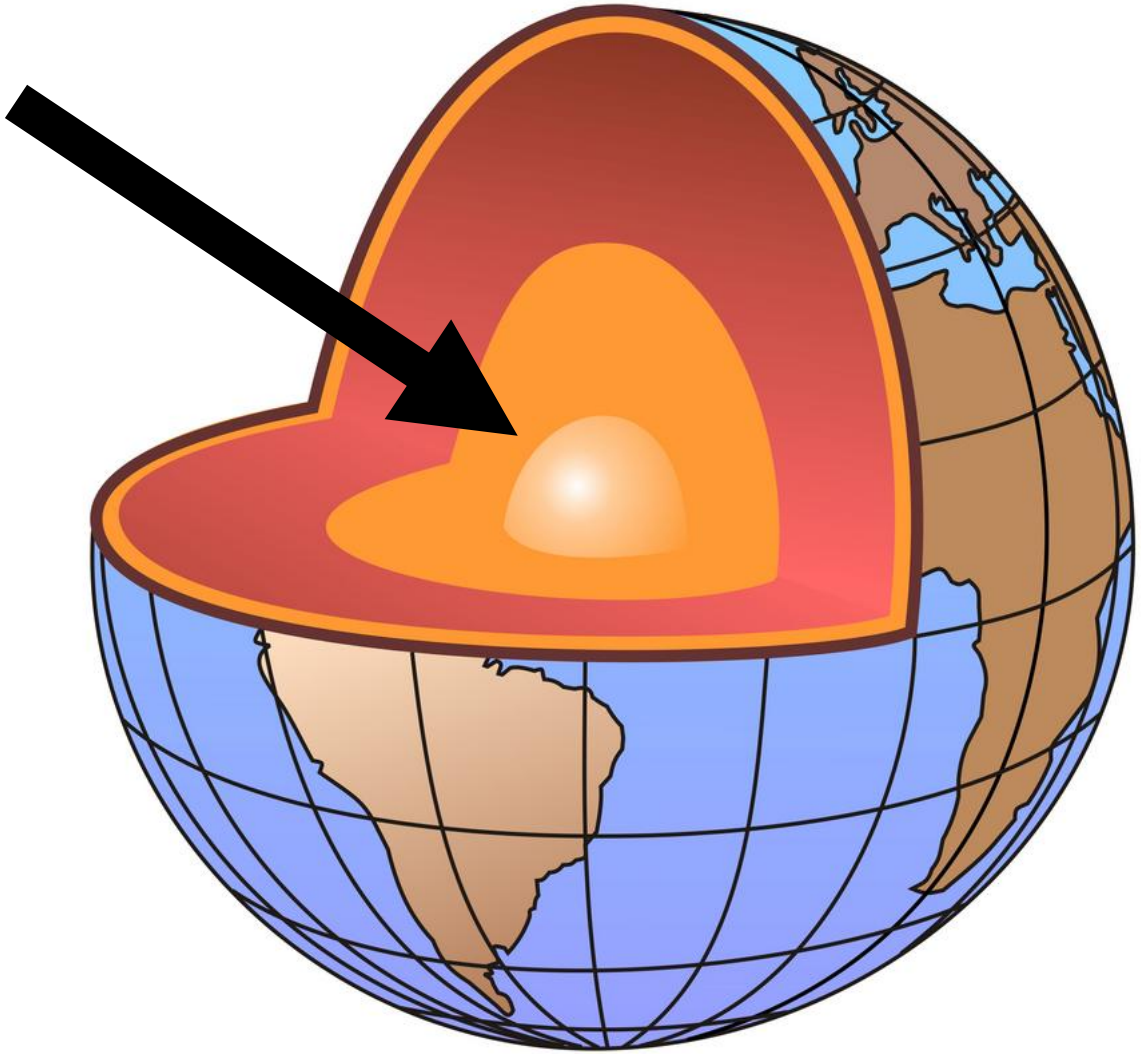
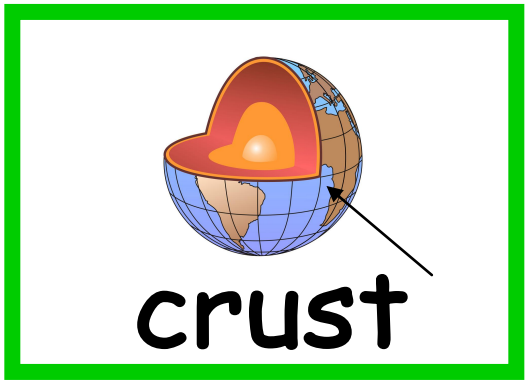


core

Crust



Question: What is the crust of the Earth?

Answer: The crust of the Earth is made up of rocks and minerals. Much of the crust is covered by water, sand, soil, and ice. The crust makes up less than 1% of the Earth's mass.

Gesture: Hold both hands together to form a sphere. Rub the outside of a curved hand to show the crust.

Examples: Have students build a cutaway, to scale, model of the Earth using a Styrofoam ball. Have students cut away a quarter of the ball and use markers to color in each layer (crust, mantle, core).

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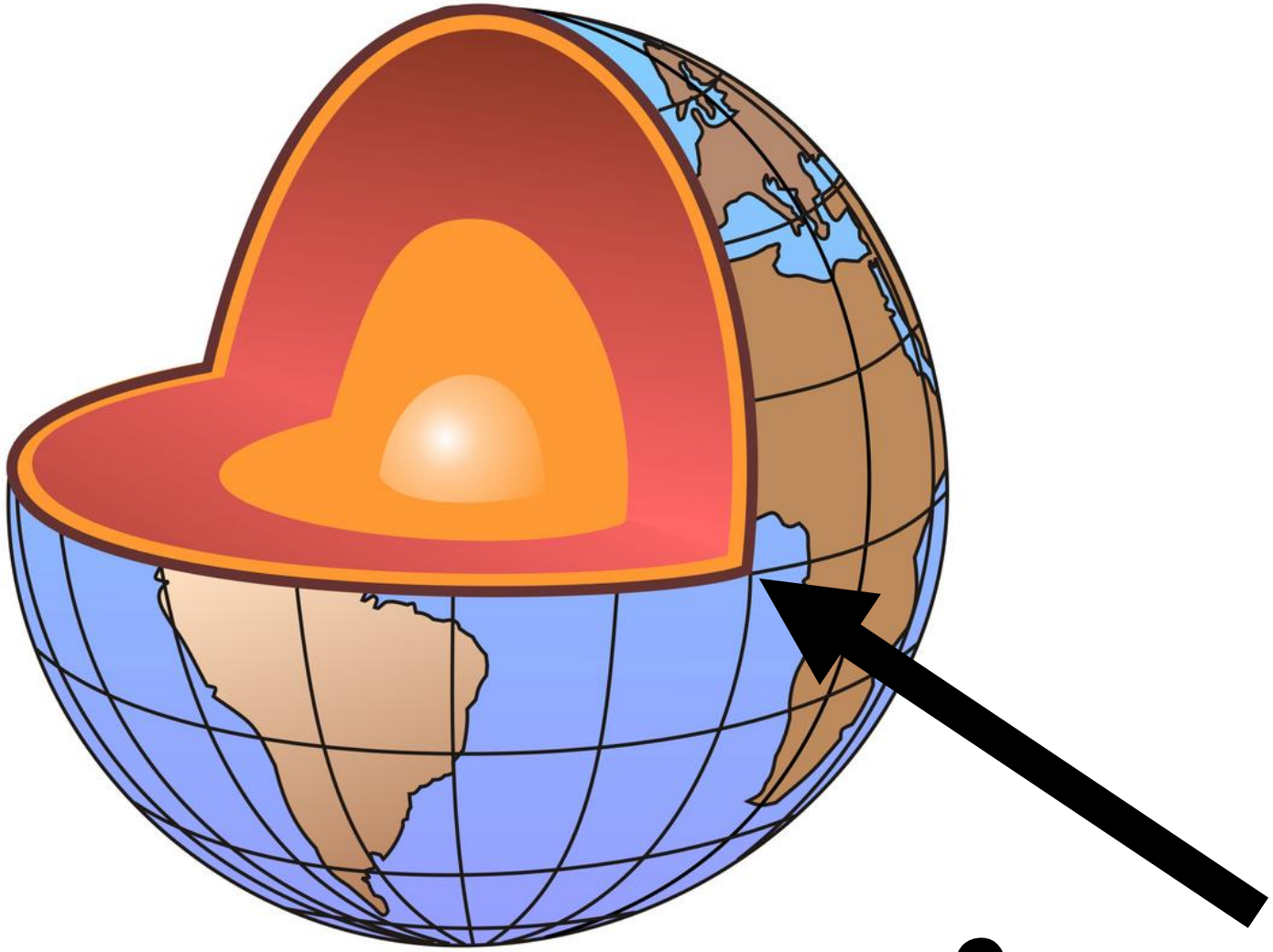
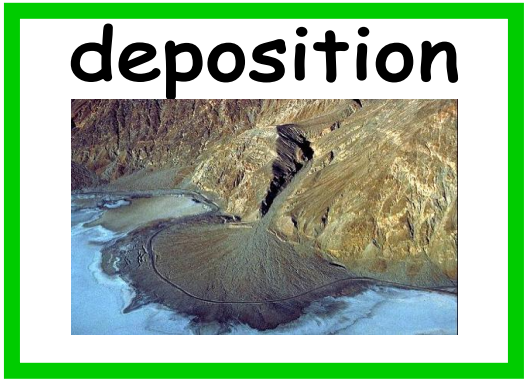


crust

Deposition



Question: What is deposition?

Answer: Deposition is the process by which rocks, sand and sediment are deposited by the forces of erosion. Deposition is tied to the processes of weathering and erosion.

Gesture: Hold your hand in a fist. Rub your fist with your other hand and wiggle your fingers as you move your hand away and placing it on a flat surface (showing sediment moving from one location to another).

Examples: Give each student an eraser, a piece of typing paper (colored pencils, markers, scissors, and glue may be placed on several desks for groups of students to use).
Have students "erase" on their desks or a piece of paper for a few seconds. Reposition the eraser on the desk and observe how it has changed. Draw the eraser and shavings beside the first drawing.
Have students erase more and draw another picture of the eraser and shavings. Discuss what happened to the eraser – how it changed shape, how pieces were rubbed away, etc.
Tell the students that their drawings represent three processes that occur in nature (weathering, erosion, and deposition).

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deposition

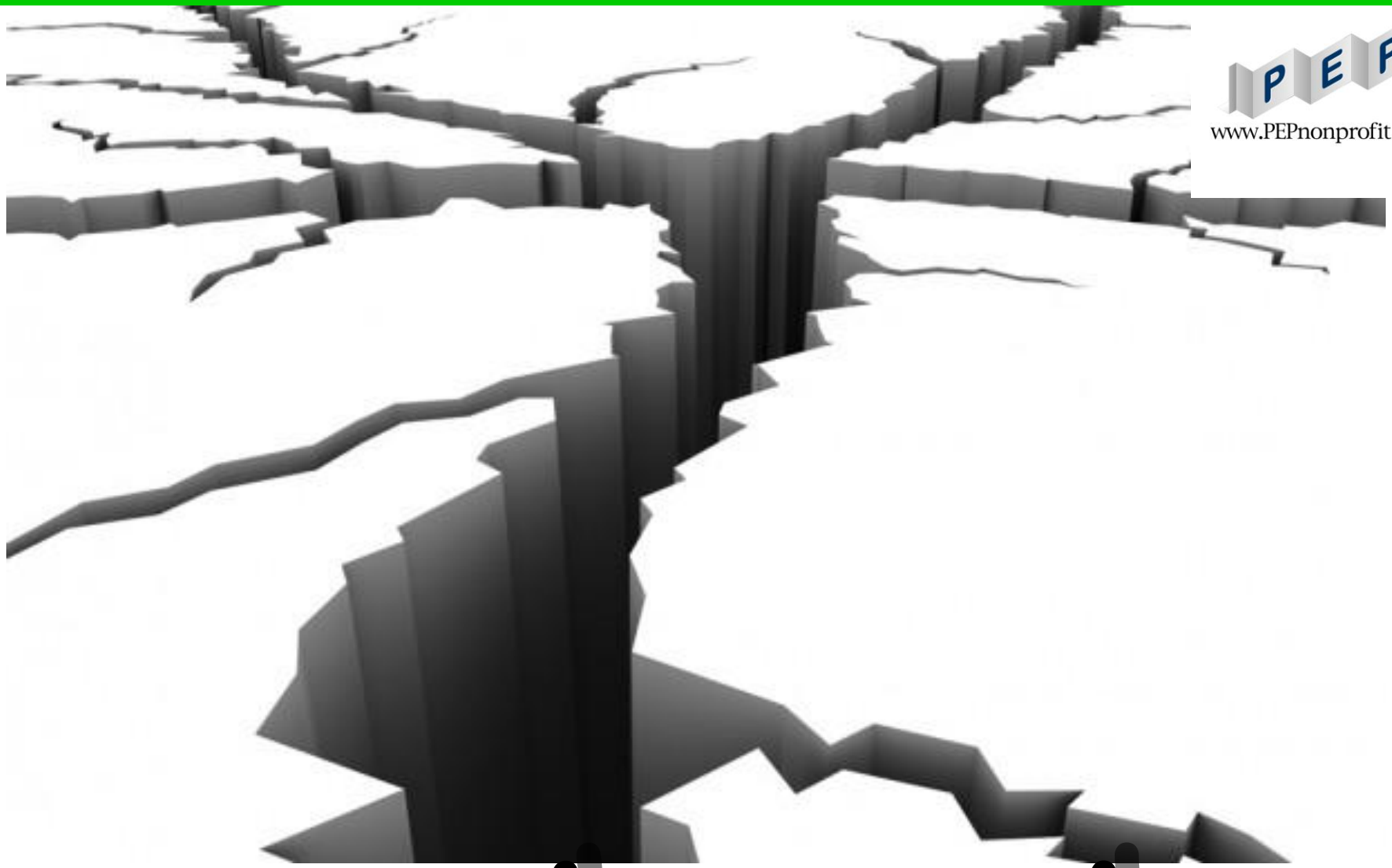
Earthquake

Question: What is an earthquake?

Answer: An earthquake is the shaking, rolling or sudden shock of the earth's surface.

Gesture: Hold your hand out flat in front of you. Shake your hand to represent an earthquake.

Examples: Use a hole puncher to punch out two holes on one side of each piece of cardboard. Then put the string through the holes. Tie a knot using the ends of the string for both pieces of cardboard. Tape the cardboard pieces together but lay them so that the ends are not touching. Place the cardboard pieces on the cookie sheet. Put some dirt over top of the pieces. Make sure the dirt is covering both pieces completely. Pull on the strings outward and watch the dirt as it simulates an earthquake.



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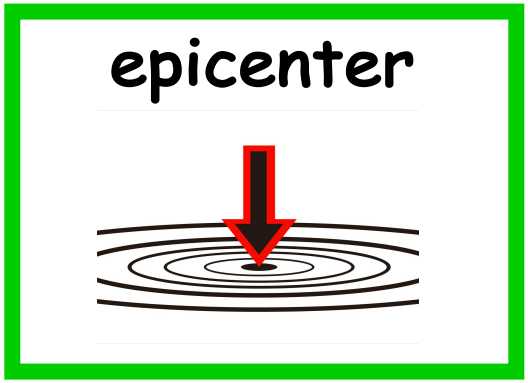
earthquake

Epicenter



Question: What is an epicenter?

Answer: An epicenter is the point on the earth's surface directly above the source of the earthquake.

Gesture: Shake your hands representing an earthquake, and then pretend to push a button (representing the epicenter).

Examples: Generate interest in earthquakes by showing the students pictures, simulations, and maps of historic earthquakes in the United States and around the world. Data, such as damage estimates in dollars, number of deaths, and Richter magnitude, show the importance of specific events and the reasons for studying the causes and characteristics. Talk about how scientists are able to determine the epicenter of these earthquakes and some of the tools needed to do so.

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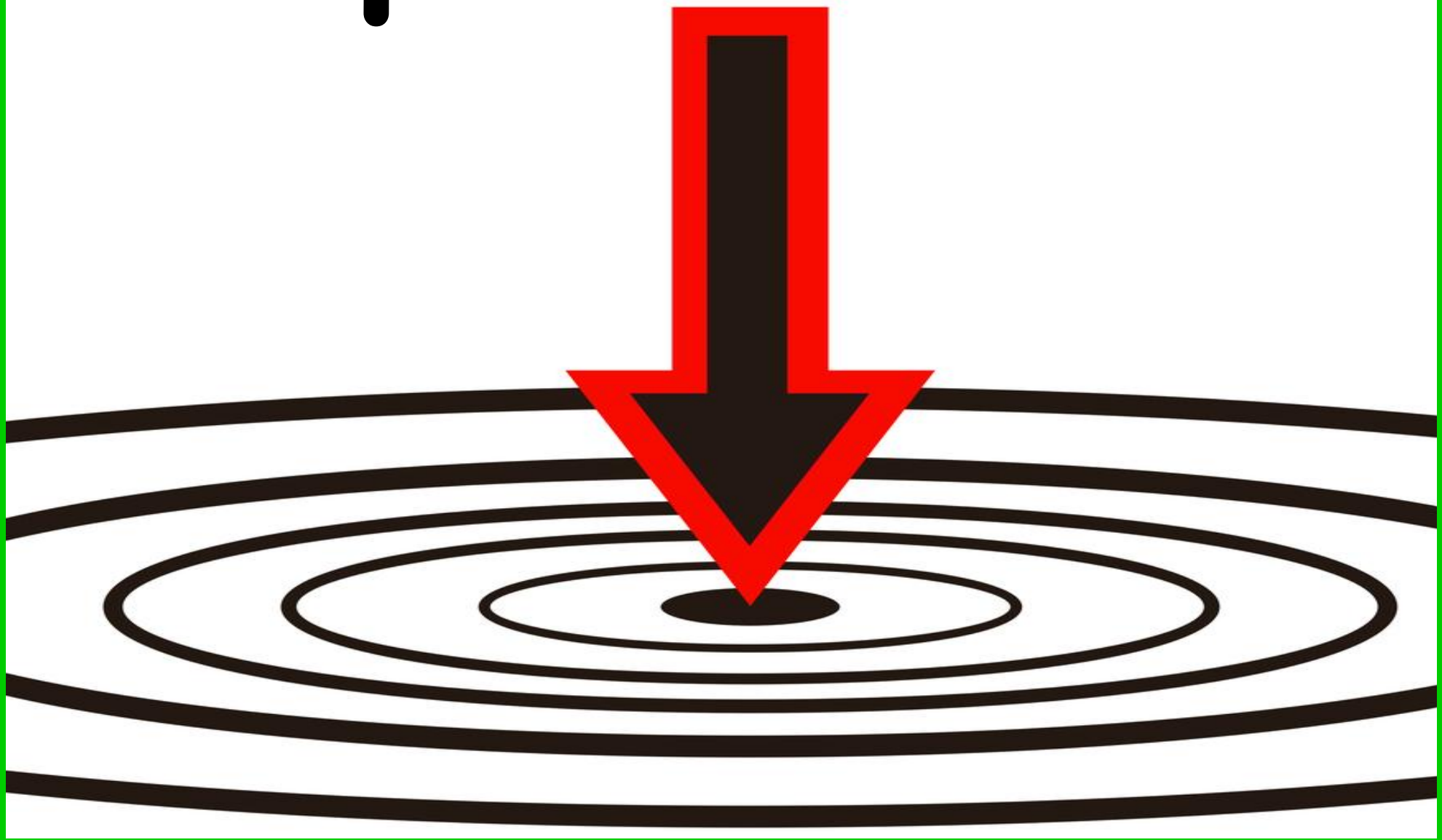
epicenter



Erosion

Question: What is erosion?

erosion

Answer: Erosion is the condition in which the Earth's surface is worn away by the water and/or wind.

Gesture: Hold your hand up with all of your fingers together. Blow on your hand and gradually move a couple fingers to make a space to show wind changed the surface of your hand.

Examples: To present the concept of erosion, show students sugar cubes and pebbles. Have students put 10 sugar cubes and 10 pebbles into a container and put on lid. Kids will shake the container and then pass the container around their group, allowing students to shake during the 10 minutes. Discuss erosion with students and the effects on the sugar cubes.

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erosion

Fault Line

fault line

Question: What is a fault line?

Answer: A fault line is an area of stress in the earth where broken rocks slide past each other, causing a crack in the Earth's surface.

Gesture: Hold both arms out straight in front of you and press your forearms together. Move one to the left and the other to the right.

Examples: Have your students about fault lines by turning a fault line map into a coloring page. Provide them with copies of a state map diagram and art supplies. As they place color on the image, have them identify the fault lines with a marker (or some other medium different from the rest used for the map). Display the fault line artwork around the classroom.

fault line

Fossil

fossil

Question: What is a fossil?

Answer: A fossil is the remains or impression of a prehistoric organism preserved in petrified form or as a mold or cast in rock

Gesture: Hold very still as if you are a fossil.

Examples: Give each student a lump of moist clay about the size of the palm of their hand. Work clay into flat "rock" form. Students should have a few very small pieces of plant (and optionally, clean animal remnants such as snail, shell or feather) to work into clay.
Each student must choose two of the following possible fossil types to show in their clay "rock." Options on how to use materials:

- embedded plant material
- imprint of plant (e.g. leaf print or stem print)
- embedded animal remnant or evidence (e.g. snail or shell bit)
- imprint of animal remnant or evidence (e.g. feather print, or human hand print)

Set aside to dry. The clay will harden into a hard "fossil."

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fossil

Igneous Rock

Question: What is an igneous rock?

Answer: An igneous rock is a rock formed by the cooling and hardening of melted rock material.

Gesture: Hold your hands together to represent a rock, then pretend to light a match (fire to melt rock). Blow on your hands (cooling) and put hands back together to show newly formed rock.

Examples: The term igneous comes from the Latin ignis, meaning fire. Igneous is used to describe rocks that crystallized out of hot molten material in the Earth called magma. When magma pushes up through Earth's crust to the surface, it is called lava. Both magma and lava cool and harden to form igneous rocks.

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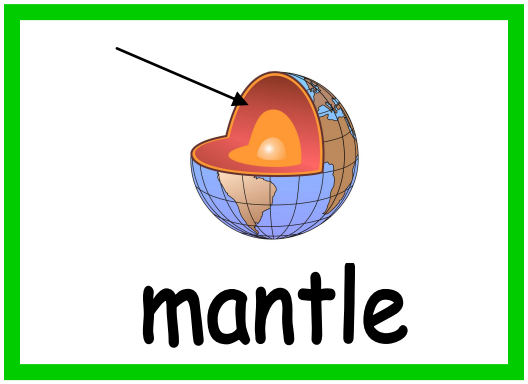
igneous rock

Mantle

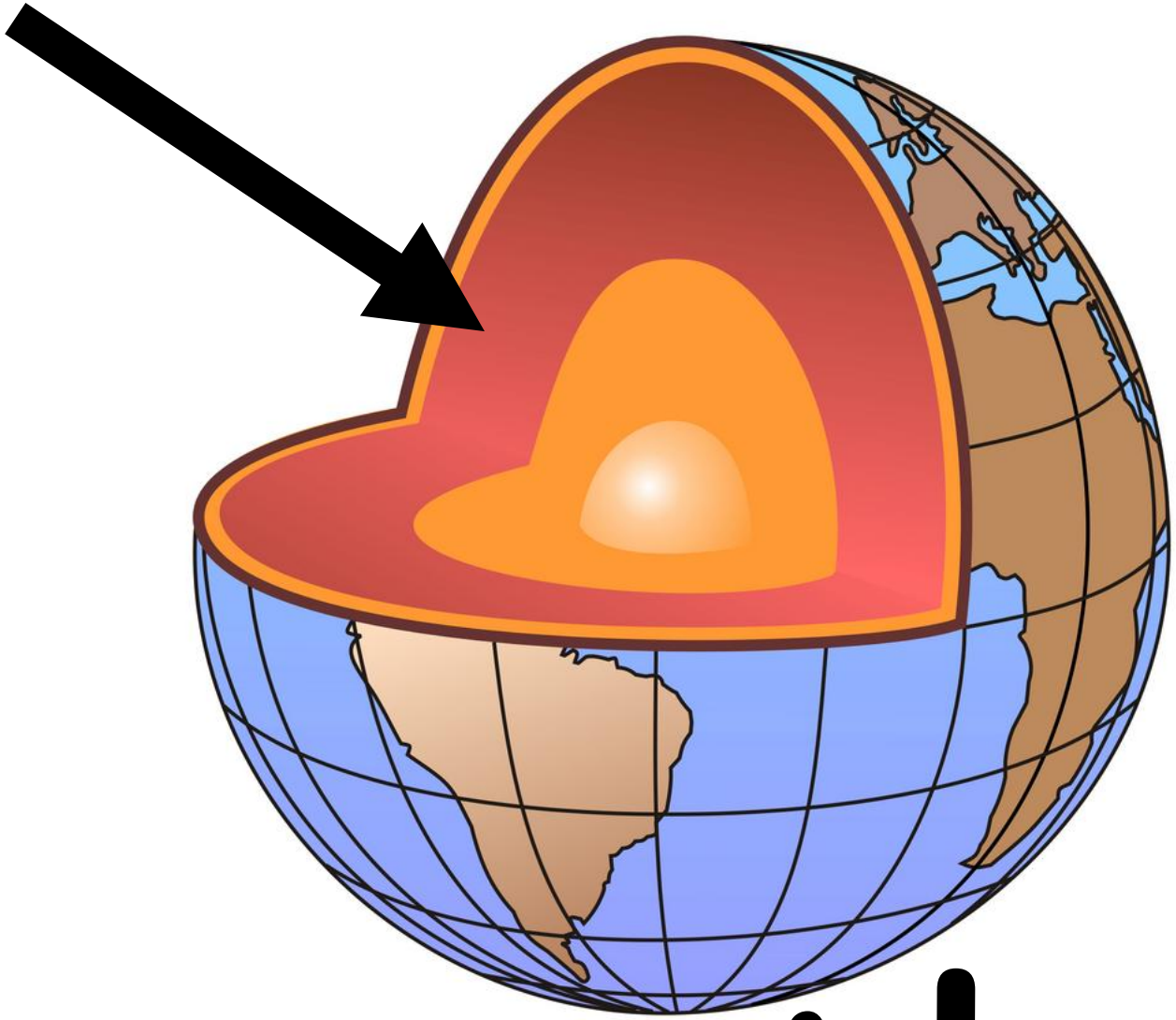


Question: What is a mantle?

Answer: A mantle is the solid casing of the Earth just below the crust. It makes up 70% of the Earth's mass and is made up of silicon, oxygen, aluminum, and iron.

Gesture: Hold both hands together to form a sphere. Open up your hands a bit to expose the mantle, which is just below the crust.

Examples: Use an apple to show the earth's layers. Cut the apples into quarters, from top to bottom, and give a slice to each student. Explain that the skin of the apple is much like the earth's crust; it's very thin compared to the other layers. The meat of the apple portrays the earth's mantle, which makes up the majority of the earth and is made of molten rock, very similar to hot asphalt. The apple's core resembles that of the earth's core, which has two distinct compartments: one inner, one outer.



mantle

Metamorphic Rock

Question: What is a metamorphic rock?

Answer: A metamorphic rock is a rock that was once one from of rock but has changed to another under the influence of heat, pressure, or some other agent without passing through a liquid phase.

Gesture: Hold your hands together to represent a rock. Then push your hands together hard, causing pressure. Finally put hands together to represent a new rock.

Examples: Have students take paper labels off of some broken crayons. Place multiple broken crayons in a cupcake wrapper (tin). Place cookie sheet filled with kids broken crayons to show how metamorphic rocks form under heat and pressure.

metamorphic rock

Mineral

mineral

Question: What is a mineral?

Answer: A mineral is an inorganic solid regular crystal structure made by nature with a predictable chemical formula.

Gesture: Squint your eyes (sparkles from the crystals) and interlace your fingers, but in a way that your fingers are sticking out between one another.

Examples: Make salt crystals. First fill a jar half full with warm water. Next, stir salt into the water until no more salt will dissolve. Then, attach a thread or string to a pencil and hang it above the solution. Do not let the thread touch the bottom of the jar. Have students observe the salt crystals each day. As the water evaporates, cubic salt crystals will form on the thread. Use a magnifying glass to examine the salt crystals. Check to see if the students can see the cubes?

mineral

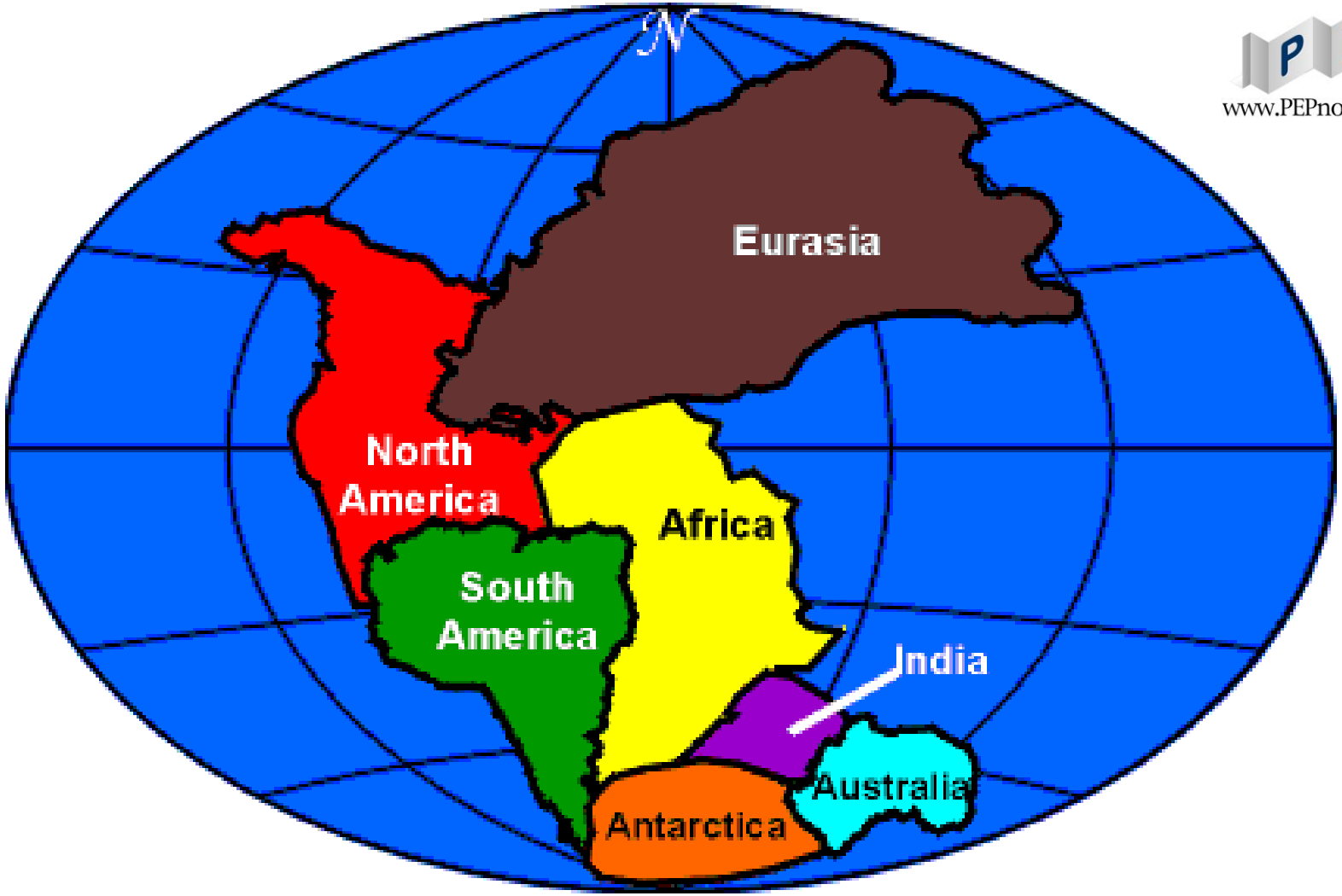
Pangea

Question: What is pangea?

Answer: Pangea is a hypothetical supercontinent that included all the landmasses of the earth before the Triassic Period. The landmasses eventually broke apart into current form.

Gesture: Interlace all of your fingers together to form one giant hand of fingers. Slowly pull your hands apart to show how the continents broke apart.

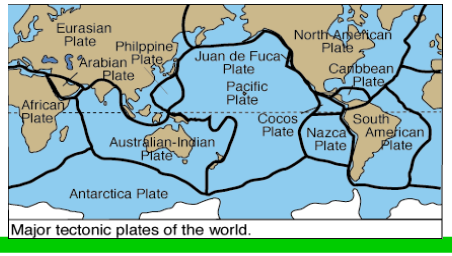
Examples: Print out a black lined master of the seven continents. Have students cut out the continents like puzzle pieces and see if they can connect them all into Pangea.



pangea

Plate Tectonics

plate tectonics



Major tectonic plates of the world.

Question: What are plate tectonics?

Answer: Plate tectonics are continents drifting from place to place breaking apart, colliding, and grinding against each other.

Gesture: Slowly pull your hands apart to show how the continents break apart…stress the slowly part.

Examples: Take a hard-boiled egg and crack its shell. The can be seen as a tiny model of the Earth. The thin shell represents the Earth's crust, divided into plates; within the shell is the firm, but slippery mantle. Move the pieces of shell around. Have the students notice how the shell buckles in some areas and exposes the mantle in other places The movement of the plates result in land formation and earthquakes to name a couple.

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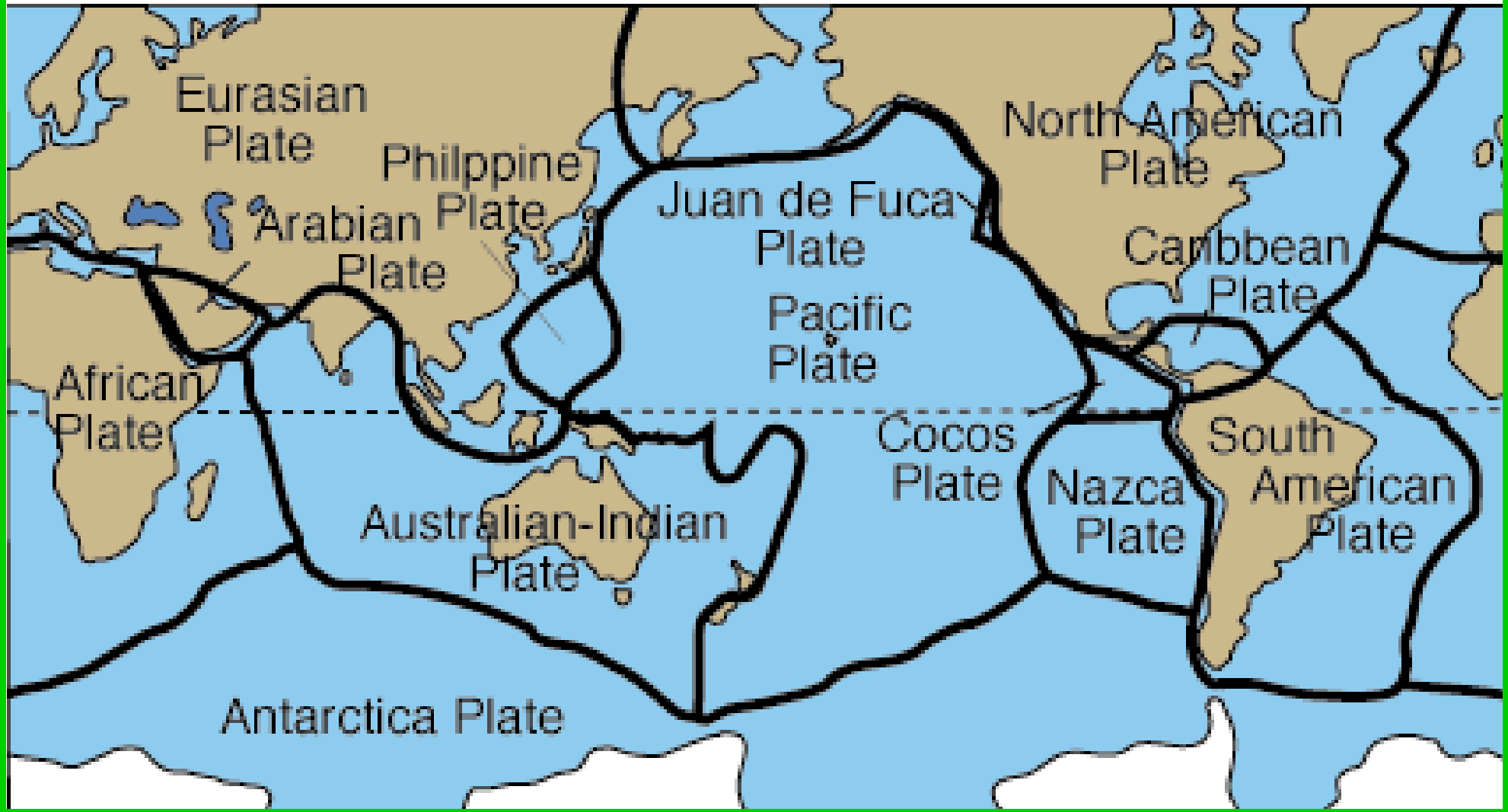
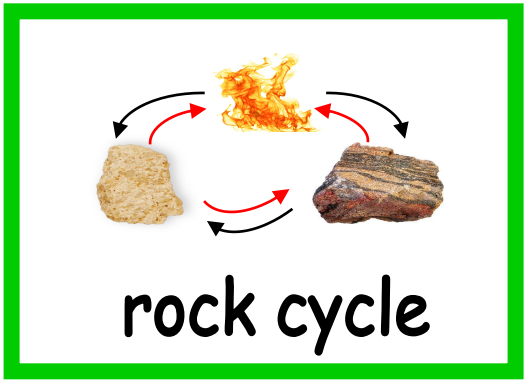
plate tectonics



Rock Cycle



Question: What is the rock cycle?

Answer: The rock cycle is a repeating process that causes various types of rocks(sedimentary, igneous, metamorphic) to form and breakdown

Gesture: Make a circle in the air with your finger, then perform the gestures for igneous, metamorphic, and sedimentary rocks. (igneous) Hold your hands together to represent a rock, then pretend to light a match (fire to melt rock). Blow on your hands (cooling) and put hands back together to show newly formed rock.(metamorphic) Hold your hands together to represent a rock. Then push your hands together hard, causing pressure. Finally put hands together to represent a new rock. (sedimentary) Pretend to grab different things and put them in your hands. Mix the pretend items all together as you roll your hands over one another. Hold your hands together to represent a rock.

Examples: Follow the link for a great crayon rock cycle activity.
http://www.exo.net/~emuller/activities/Crayon-Rock-Cycle.pdf

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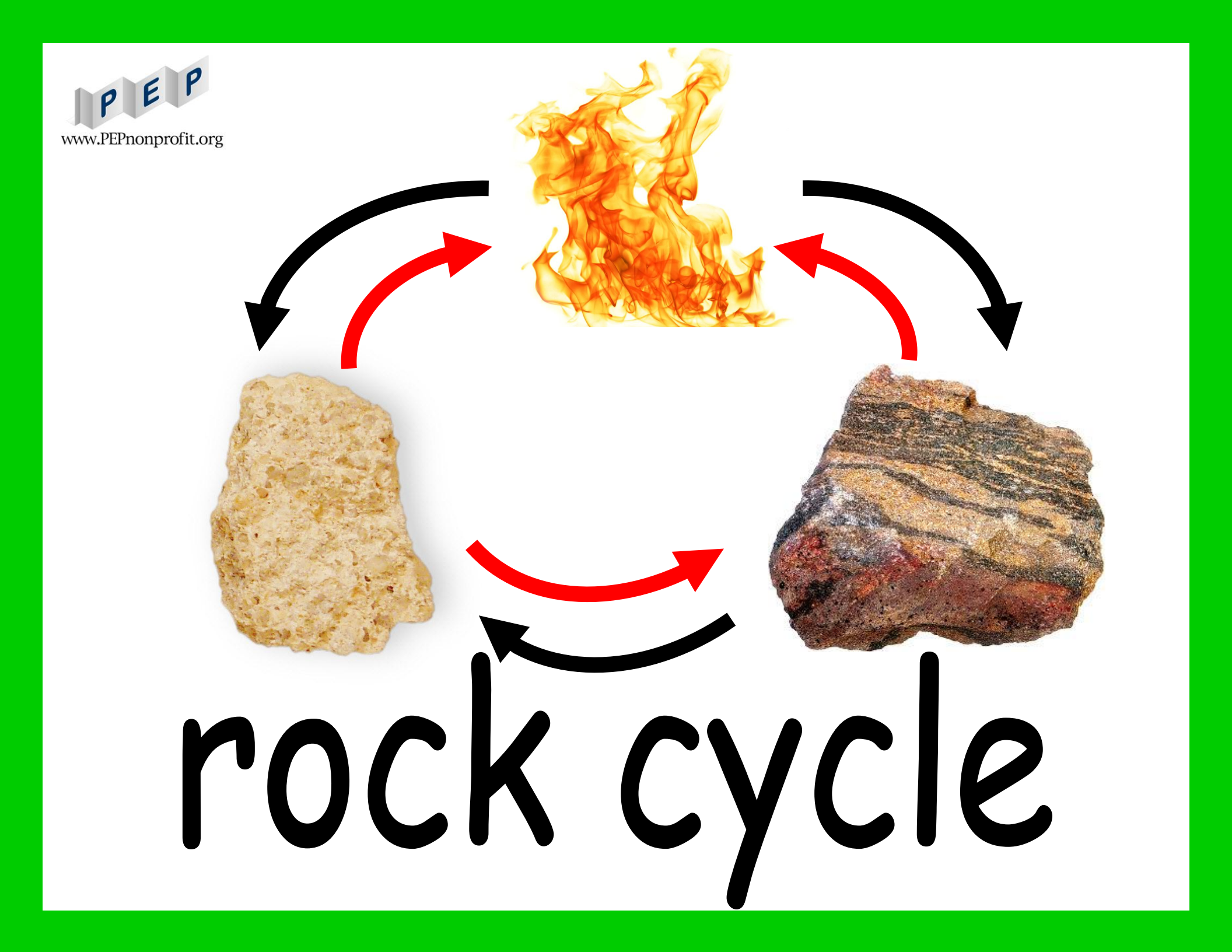

rock cycle

Sedimentary Rock

Question: What is a sedimentary rock?

Answer: A sedimentary rock is a rock that is formed by the collection of pieces of rock that have been broken down from other rocks by weathering or erosion

Gesture: Pretend to grab different things and put them in your hands. Mix the pretend items all together as you roll your hands over one another. Hold your hands together to represent a rock.

Examples: Fill a jar with equal amounts of pebble, sand, broken twigs, and crushed leaves. Pour one-fourth cup Epsom salt over the mixture. Add water until there is approximately two inches of space at the top of the jar. Put the jar lid on tight and give a vigorous shake. Once the ingredients are completely mixed (sediments should be float in the water), place the jar on a flat surface. Check the jar every hour. After the layers have settled, pour all of the water out of the jar and let it dry completely. Let students explore the sedimentary rock and see how all of the sediments have formed a new rock.

sedimentary rock

Soil

Question: What is soil?

Answer: Soil is the upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains.

Gesture: Pretend to dig a hole and place a seed in the hole, then fill the hole back up with soil.

Examples: Go around school or home and collect different soil samples (try a minimum of three different samples). Have students feel the texture, test how much water can be absorbed, and finally plant the same seed in all soil samples. Let students make a hypothesis on which soil they believe will provide the best nutrients for the seed to sprout.

soil

Volcano

volcano

Question: What is a volcano?

Answer: A volcano is an opening in the earth's surface, which allows liquid rock, ash, and gases to escape from inside the earth.

Gesture: Hold both of your arms up to form a volcano. Push your hands together and push forward to represent and eruption.

Examples: Ask your students if they think that volcanoes can change the way the Earth looks. Based on what they already know about volcanoes, what might cause the changes? (*Lava*, *ash*, *explosions*.) Explain that when the hot lava stops flowing and cools, it can create rocks or new land that looks very different from the original landscape, and that volcanic activity is responsible for shaping much of how the earth looks today.

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volcano

Weathering – Chemical

Question: What is chemical weathering?

Answer: Chemical weathering is the process that causes exposed rock to undergo chemical change or changing the chemical composition of the material.

Gesture: Hold one hand tight like a fist and rub your other hand on top the fist. Have the fist slightly change form, but keep it pretty close to the first (representing chemicals altering the form of the material).

Examples: Drop an antacid tablet into a beaker of water. Explain as it dissolves that these tablets contain sodium bicarbonate which dissolves in water in much the same way that carbonate rocks dissolve in carbonic acid.

Weathering – Physical

physical

weathering

Question: What is physical weathering?

Answer: Physical weathering is a mechanical process by which rocks exposed to the weather undergo changes in character and break down.

Gesture: Hold one hand tight like a fist and gradually loosen it to form a curved arc (like the picture on the concept learning brick).

Examples: Place an antacid tablet on a table and break it with a hammer. Explain that this is a form of physical weathering - the physically breakdown of rocks into smaller fragments without changing their chemical composition. Ask the following question: What are some things that might cause physical weathering? (Possible *a*nswers may include: extreme heat, extreme cold, exfoliation, crystal growth, the growth of lichens and plant roots-also called biological weathering-and human and animal traffic*)*.

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physical

weathering