Hands On Earth Science Activity No. 2
Egg Tectonics

This activity can be used to help teach the following Topics and Content Statements for the Ohio Revised Science Standards (2018) and Model Curriculum (2019):

Grade	Content Standard	Topic	Content Statement/Subtopic
Grade 8	Earth and Space Science	Physical Earth	8.ESS.2 Earth's lithosphere consists of major and minor tectonic plates that move relative to each other. 8.ESS.3: A combination of constructive and destructive geologic processes formed Earth's surface.
Grades 9–12	Physical Geology	Plate Tectonics	PG.PT.1: Internal Earth PG.PT.2: Structure of Earth PG.PT.4: Plate Motion

Division Of Geological Survey
HANDS ON EARTH SCIENCE No. 2

EGG TECTONICS

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Plate tectonics, or the continental drift theory, was first suggested in 1912 by the German scientist Alfred Wegener. The theory, which states that the Earth's surface, or crust, is divided into six to nine major plates that slowly move and change in size, was not widely accepted until the late 1960's. The theory supposes that all the continents were once part of a supercontinent called Pangea. This theory explains why continents that are now widely separated from each other possess rocks and fossils of the same extinct plants and animals. Geologic events and features such as earthquakes, volcanoes, mountain ranges, hot springs, and geysers also can be explained using plate tectonics.

The slow (1-4 cm per year) movement of tectonic plates causes one of three types of boundaries: *divergent boundaries*, where plates separate; *convergent boundaries*, where plates collide; and *transform boundaries*, where plates slide past each other. The following activity simulates these plate boundaries using a cracked eggshell.

Materials:

3 (or more) hard-boiled eggs
3 (or more) water-based markers

Gently tap the eggs repeatedly on a table while rotating them to produce cracks all around the eggs. Trace along the major cracks with a water-based marker. Gently squeeze the eggs until slight movement of the shell pieces occurs. Look for places where pieces of the eggshell separate. This area represents a divergent boundary. Most divergent boundaries on the Earth are hidden beneath the oceans and are characterized by volcanism, earthquakes, and massive heat flow due to molten rock (magma) rising up from the mantle, which is the thick layer of rock separating the crust from the core at the center of the Earth. The Mid-Atlantic Ridge on the bottom of the Atlantic Ocean is an example of a divergent boundary; here the North American Plate and the Eurasian Plate are separating, causing sea-floor spreading and new oceanic crust to form. Next, look for places where two pieces of eggshell are colliding. This area represents a convergent boundary. Two events can occur when plates converge. If denser oceanic crust collides with lighter continental crust, the oceanic crust will buckle under the continental crust down into the mantle. This process is called subduction and is characterized by earthquakes, rock deformation, and volcanism. The volcanic Cascade Range of the Pacific Northwest was formed by subduction of the Juan de Fuca Plate under the North American Plate. If two equally dense continental crusts collide, both plates will resist being subducted. In this process, the continental crust folds and deforms into a mountain range. The Himalayas are an example of a mountain-building episode which began 25 million years ago and is still occurring today as India travels northward, colliding with Asia. Finally, look for places where one piece of eggshell slides past another. This area represents a transform boundary. The crust is not destroyed here as it is at a convergent boundary, nor is crust created as it is at a divergent boundary. As the two plates slide past each other, earthquakes occur. The San Andreas fault in California is an example of this type of boundary.

NOTE: After this experiment, use the eggs to illustrate the layers of the Earth. Cut the egg in half. The shell represents the crust. The thick egg white represents the mantle. The egg yolk represents the core.

SOURCE: *Terrific Science & Math* (Miami University), Fall 1993; and *Earth and Its Resources*, Creative Teaching Press.