

# Plate Tectonics

## Objectives

1. Students will learn about our current understanding of the Earth's layers, plate tectonics, and their role in land destruction and creation.
2. Students will learn how to make their own model of the Earth's layers with play-doh.
3. Students will learn how to model plate boundaries using oreos

## Quarantine kits:

- Six colors of play-doh (yellow, orange, red, blue, green, brown) of different sizes (to be proportional to the inner core, outer core, mantle, crust, ocean, continents)
- 4-6 oreos (one for each type of plate boundary, plus some extra in case oreos break during transport : ( )
- Dixie cup (3 oz or 5 oz; just needs to be enough to hold some water)
- Fishing line or floss (something thread-like) to cut through play-doh earth
- Paper plates as a surface to work on
- Worksheets (word search, map of earth with
- Students need to get cold tap water on their own
- Pencil

## References:

[https://kcts9.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp\\_platetectonics/plate-tectonics/](https://kcts9.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp_platetectonics/plate-tectonics/)

## Activity 1: Exploration of earthquakes, volcanoes, and plate tectonics (~10 min)

1. Discuss how Earth is physically changing and ask students for their ideas about why it changes. Bring up the slide with the word *plate tectonics* and ask if anyone has heard of this theory. Record class comments on the board and save for later.
2. Show students the locations of earthquakes around the world using the [Tectonic Plates, Earthquakes, and Volcanoes](#) Flash Interactive. Switch to the display of volcanoes. Do not show the plate boundaries at this point. Then ask:
  - a. What do you notice about the distribution of earthquakes?
  - b. What do you notice about the distribution of volcanoes?
  - c. Do you see any correlations or patterns?
  - d. Can you think of a possible explanation for the patterns you see?
3. Show the [Plate Tectonics: An Introduction](#) QuickTime Video. After viewing the video, return to the [Tectonic Plates, Earthquakes, and Volcanoes](#) Flash Interactive and now show the overlay of all three views: earthquakes, volcanoes, and plate boundaries. Point out the Ring of Fire. Ask students to interpret why the active areas are located where they are and to relate their interpretations to their previous comments and possible explanations.

\*Alternatively, you can also do a short presentation (slides attached)

## Activity 2: Making a model Earth out of play-doh (~15 min)

1. Have students remove their play-doh from their bags and lay out the different colors:
  - a. Yellow: Inner core
  - b. Orange: Outer core
  - c. Red: Mantle
  - d. Brown: Crust (also called the Lithosphere)
  - e. Blue: Water/oceans
  - f. Green: Land
2. Lead them through building their model Earth.
  - a. Roll the yellow playdoh into a ball. This will represent the solid inner core of the earth.
  - b. Gently flatten the orange playdoh so that it can wrap around the inner core entirely. This will represent the liquid metal outer core.
  - c. Flatten out the red playdoh so that it can wrap around the inner/outer core.
  - d. Flatten the brown playdoh. Let them know that this is the crust of the earth, also known as the **lithosphere**. Importantly, this is where all of the continental plates exist. Have the students flatten out the brown playdoh as much as possible. After they flatten their playdoh, let them know that we are going to create our own continental plates by separating their playdoh into 8-10 pieces. Then, have them arrange their plates in order on their planet.
  - e. After assembling the crust, this is where you can point out that each of these plates neighbors other plates; they share boundaries and, in reality, are constantly colliding into each other.

- f. Lastly, have the students cover their planets in water and land! Have them flatten out the blue playdoh as best as they can, and wrap their planet in it. Then, tell them to create their own continents with the green playdoh and attach it wherever they want!
  - g. Now, have them share what their playdoh earth models look like!
  - h. The last part here is to have them take out the thread in their cups. They will use this thread to cut their model Earth in half, to look inside.
3. Done! They now have what we can consider a scale model of the Earth!

## Activity 3: Modeling plate boundaries with oreos (~15 min)

\*If any of this is unclear, definitely check out youtube videos! Lots of renditions of this activity.

1. Have the students look at their sheets discussing the four types of plate boundaries (feel free to **share screen containing slides**). Tell them that we're going to model these same plate boundaries using oreos as our starting materials.
2. Before we get started, have the students go grab some milk / water! (and wash hands!)
3. First, let's look at the anatomy of an oreo cookie: have them take out one oreo, separate the top crust, and ask what they think each of these components represent:
  - a. The top cookie crust? (crust/lithosphere);
  - b. the cream center? (mantle);
  - c. the bottom crust? (the inner/outer core)
4. First, we'll model the divergent boundary. Have the students separate their cookies and apply low pressure into the mantle. What do they notice?
5. Then, we'll model the transform fault. Have them push their two crusts together and slide by each other. What do they notice? Do they hear anything?
6. Then, we'll model convergent (Continental collision). Dip both edges of the plate boundaries in milk/water. Let the plates sit for a bit. Then push them together on the mantle. What should happen is that mountains should form / both plates should be thrust upwards!
7. Finally, model convergent (Subduction). Dip just one of the plates in milk/water. Let the plates sit for a bit. Then push them together on the mantle. What should happen is that mountains should form / both plates should be thrust upwards!
- 8.
9. For each of these, have the students use a separate cookie, and draw what they see for each plate.
- 10. Have students share what they observe with each of the model plate boundaries**
- 11. Discussion questions:**
  - If you had to take a guess, which of these plate boundaries form mountains? Why do you think that? (answer: convergent boundaries, both types)
  - What about earthquakes? (all do!)
  - Why is it important for us as scientists to understand plate tectonics and how the earth moves?

## Activity 4: (if students finish early) Word search while eating oreos :)

- While they complete their word search, feel free to discuss what each of the terms mean

## Concluding remarks / share your model Earth (~5-10 min)

Revisit discussion question: Why is it important for us as scientists to understand plate tectonics and how the earth moves? Show them the slide highlighting that we live in a very unique area on the planet where we are close to two types of plate boundaries.