Snack Tectonics or Modeling Plate Movement
Objective: Use models to describe how tectonic plates cause major geological events such as; ocean basins, earthquakes, volcanoes, and mountain building.

Questions:
- How does a model help us understand plate movement?
- How do the movements of tectonic plates cause geological events?
Snack Tectonics

Find your lab data page:

Divergent Plate Boundary
1. Divergent means:
2. What layer does each food represent?
   - Frosting
   - Fruit Roll up
3. Now draw what your food looks like after your created the boundary. Label each item drawn as a layer or process of the earth. Terms to use: divergent plate boundary, oceanic crust, asthenosphere.

Reflection Question: When divergent plates pull apart, how is new crust being made?

Convergent Plate Boundary (continental-continental)
1. What layer does each food represent?
   - Frosting
   - Graham Cracker
2. Now draw what your food looks like after your created the boundary. Label each item drawn as a layer or process of the earth. Terms to use: asthenosphere, continental crust, convergent plate boundary

Reflection Question: In our model, the wet edges of the cracker buckled or folded. What geological event does this buckling mimic? Why do you think this event occurs in real life?

Convergent Plate Boundary (continental – oceanic)
1. Convergent means:
2. What layer does each food represent?
   - Frosting
   - Fruit Roll up
   - Graham Cracker
3. Now draw what your food looks like after your created the boundary. Label each item drawn as a layer or process of the earth. Terms to use: convergent plate boundary, asthenosphere, oceanic crust, continental crust

Transform Plate Boundary (continental – oceanic)
1. Transform means:
2. What layer does each food represent?
   - Frosting
   - Graham Cracker
3. Now draw what your food looks like after your created the boundary. Label each item drawn as a layer or process of the earth. Terms to use: transform plate boundary, asthenosphere, continental crust
Each student should have:

- 2 squares of graham cracker
- 2 squares of fruit roll up
- 1 cup of water (for 2 people to share)
- Frosting (teacher will distribute)
- 1 sheet of wax paper
- 1 plastic knife
- 1 paper towel
Procedure:

- Use data sheet to write down data and observations
- Listen carefully to instructions on how to make each type of boundary
- We will be working step by step as a class (no working ahead) – LISTEN & FOLLOW INSTRUCTIONS!!
- No side-bar conversations
- Record your scientific observations
Set Up for First Experiment

**Set up:**

- Spread frosting into about a 4 in. square that is ~0.5 cm. thick
- Wax paper (To contain mess!)
- Frosting Asthenosphere

Have these ready, but to the side of your wax paper:

- Fruit roll up pieces: Oceanic crust plates
- Graham crackers: plates of continental crust

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Divergent plate boundary

1. Place the two plates of oceanic crust (fruit roll up pieces) side by side lightly on the frosting asthenosphere.

2. Press down slowly on the oceanic plates (because they are dense and will sink a bit into the asthenosphere) as you slowly push them apart about half a cm.
Divergent Plate Boundary

Answer these questions on your data sheet:

1. Divergent = to move away or apart from each other

2. What layer does each food represent?
   - frosting – asthenosphere
   - fruit roll up - oceanic plate

3. Draw what your food looks like after you created the divergent boundary in the space provided

4. Label drawing as to what each item represents in terms of Earth layers or processes of plate tectonics. Use these words: asthenosphere, oceanic crust, divergent plate boundary

(example next slide)
An Example Drawing with Labels:

fruit roll up = oceanic crust

black arrows show divergent boundary

frosting = asthenosphere
When divergent plates pull apart, how is new crust being made?
Mid-Ocean Ridges – two oceanic plates pull apart. The result is a mid-ocean ridge, such as the Mid-Atlantic Ridge.

The new crust is made as the plates pull apart and the magma rises and cools. This hardens into new rock/crust.
Rift Valleys – two continental plates pull apart. The result is a rift valley, such as the Great Rift Valley in Africa.
Continental-oceanic collision

1. Remove one of the fruit roll ups from the frosting.

2. Place one graham cracker lightly onto the frosting asthenosphere next to the remaining fruit roll up. Continental crust is less dense than oceanic crust. It floats high on the asthenosphere so don’t push it down.

3. Gently push the continent (graham cracker) towards the ocean plate (fruit roll up) until the two overlap and the graham cracker is on top. The oceanic plate has been subducted!
Convergent Plate Boundary
(continental to oceanic)

Answer these questions on your data sheet:

1. Convergent = to collide or crash into each other
2. What layer does each food represent?
   - frosting –
   - fruit roll up –
   - graham cracker -
3. Draw what your food looks like after you created the convergent (continental to oceanic) boundary in the space provided
4. Label drawing as to what each item represents in terms of Earth layers or processes of plate tectonics. Use these words: convergent plate boundary, asthenosphere, oceanic crust, continental crust
When continental crust and oceanic crust collide, one plate goes under another. Explain why the process of **subduction** occurs.
One tectonic plate moves under another tectonic plate, thus sinking into the mantle, as the plates converge.

When an oceanic plate pushes into and subducts under a continental plate, the overriding plate is lifted up and a volcanic mountain range can be created.

Example: Andes Mountains In South America
Andes Mountains in South America

Volcanic Mountains created by convergence of oceanic to continental plates
One tectonic plate moves under another tectonic plate, thus sinking into the mantle, as the plates converge.

When an oceanic plate pushes into and subducts under another oceanic plate, the overriding plate is lifted up and an island arc can be created.

Example: Aleutian Islands of Alaska
Aleutian Islands

Island arc created by convergence of oceanic to oceanic plates
Continent-continence collision

1. Remove both the cracker and fruit roll up from the frosting asthenosphere.

2. Place one edge of both crackers into the glass of water for just a few seconds.

3. Place the crackers onto the frosting with wet edges next to each other.

4. Slowly push the graham crackers towards each other.
Convergent Plate Boundary
(continental to continental)

Answer these questions on your data sheet:

1. What layer does each food represent?
   - frosting –
   - graham cracker -

2. Draw what your food looks like after you created the (continental to continental) convergent boundary in the space provided.

3. Label drawing as to what each item represents in terms of Earth layers or processes in plate tectonics. Use these words: asthenosphere, continental crust, convergent plate boundary.
In our model, the wet edges of the cracker buckled or folded. What geological event does this buckling mimic?

Why do you think this event occurs in real life?
When two continents meet or collide head-on, neither plate is subducted because the continental rocks are relatively light. Instead, the crust folds and buckles. The collision of India into Asia 50 million years ago caused the mountains known as the Himalayans.
Transform plate boundaries

1. Pick the two crackers up off the frosting and turn them around so that two dry edges are next to each other.

2. Push one cracker past the other to simulate a transform plate boundary like the San Andreas fault!
Transform Plate Boundary

Answer these questions on your page:

1. Transform = to slide past each other
2. What layer does each food represent?
   - frosting –
   - graham cracker -
3. Draw what your food looks like after you created the transform boundary in the space provided
4. Label drawing as to what each item represents in terms of Earth layers or processes of plate tectonics. Use these words: transform plate boundary, asthenosphere, continental crust
What happened to the dry edges of the cracker?

How is this model similar to what happens in an earthquake?
Transform Boundaries are where two plates are sliding horizontally past one another. When the two plates slide past each other, energy builds up and when released, the stress and pressure of this movement can cause an earthquake.

Example: The San Andreas Fault in California
Finishing and Clean Up!

- When I say “GO” - you may eat what you like of your experiment

- When you are done eating:
  1. Throw away food, knife, and used wax paper
  2. Clean any debris left on table tops
  3. Place a new piece of wax paper and paper towel at your spot
  4. Put fresh water into the cup and put it back on the table
  5. Look around your area to make sure everything is picked up and clean
  6. After cleaning, let’s address the purpose of this lab and questions.
How does a model help us understand plate movement?

How do the movements of tectonic plates cause geological events?
Conclusion Questions

Find this title: “Conclusion: Snack Tectonics Lab” and write down the questions and your answers on the page:

1. How are convergent plates different from divergent plates?
2. What are some features on Earth that are caused by plate movement? (list at least two)
3. Explain what happens during the process of subduction in your own words.