Try This at Home Science:
Graham Cracker Plate Tectonics

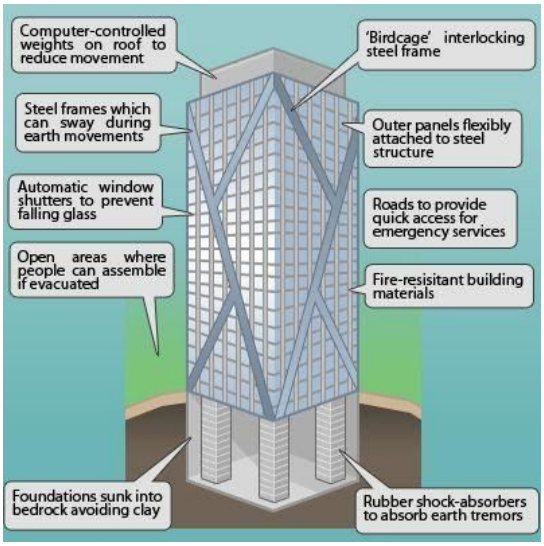
Activity Overview:
Use graham crackers to learn how earthquakes can change the landscape!

Materials:
- 4 graham crackers broken in half
- Frosting of choice
- Sprinkles of choice
- Plate
- 2 table knives
- 3 small bowls
- Food coloring
- Water
- Towels for clean up

Try this!
1. Fill two small bowls with frosting and add food coloring to each to create two different colors of frosting. Mix each with a table knife.
2. Use the knife to carefully spread four frosting blobs onto the plate to create the **mantle**.
3. Place a pair of graham cracker pieces side by side on three of the frosting **mantle** layers to create the **tectonic plates**. Set the two remaining graham cracker pieces aside.
4. Using the knife carefully spread a thin layer of frosting across each pair of graham crackers to create the **crust** of the Earth.
5. Add sprinkles on top of each **crust** in a pattern, like in the image below to represent **cities and roads**.
6. Choose one pair of graham crackers and start slowly sliding the graham crackers in one direction so the edges slide past each other. Observe. Can you feel any vibrations?
7. Choose the next pair of graham crackers on the plate and slowly slide them apart. Observe.
8. Take the last pair of graham crackers on the plate and push them together so one of the graham crackers slides over the top of the other one. Observe.
9. Fill one small bowl with warm water, and take the last two graham crackers and dunk one edge of each in the water for about 5 seconds.
10. Remove the graham crackers from the water and place on the last frosting blob with the soggy ends touching.
11. Slowly push the two soggy ends of the graham crackers together and observe.

What's happening?
We have replicated three layers of the Earth and four different types of tectonic plate activities! The orange frosting mantle contains the magma layer that sits below the graham cracker tectonic plates. As the graham cracker tectonic plates move over the frosting mantle,

we observe how the magma and the plates interact with each other and the crust. When the graham crackers move apart from each other, or **diverge**, we see how the crust can fall into the mantle as the plates separate creating a trench. When the graham cracker tectonic plates slide past each other, or **transform**, the landscape is transformed by shifting the affected communities based on the plate movement. Finally, as the graham cracker tectonic plates **converge**, or come together, each plate has pressure building up in it until one of the graham crackers slides underneath the other causing the tectonic plate to lift the crust and create a new mountain formation. The action of convergence can also cause volcanoes to form in the cracks left behind from the tectonic activity.



How does this relate to engineering?

From this experiment we can see how it may be difficult to build on or near fault lines. This means that if there are cities that can be affected by tectonic activity, like earthquakes, extra precautions in the architecture of the building must be applied. In many cases of “earthquake proof” buildings there are additions made to a standard building to help protect it during an actual earthquake. For example, many of these buildings have extra deep foundations, and have rubber pads underneath them to help absorb vibrations from tectonic activity. This foundation and extra support acts like the soles of our tennis shoes as they absorb the shock and vibrations as our shoes hit the pavement when we run. These buildings also have a supportive cage built around them to prevent the building from twisting too much, similar to a tomato cage in the garden helps to support the tomato plant as it grows.

Now try…

- Build a mini marshmallow tower on each of your graham cracker tectonic plates. Repeat the experiment to see how well your marshmallow tower holds up to the different types of tectonic activity. What did you notice? How tall could you build your tower? Would a different candy withstand the tectonic activity better?

Additional Information

Watch a how-to video for this experiment here Plate Tectonics Graham Cracker Lab

For more “Try This at Home Science” activities, visit www.mi-sci.org.