**Activity 1: Soapy Stress (15 minutes) 3.30PM-3.45PM**

Supplies provided: Soap (3 broken pieces of soap)

Reference: https://www.teachengineering.org/activities/view/cub\_rock\_lesson01\_activity1

Instruction:

1. Go through the three types of stress we talked about in the class:
   1. Compression, tension and shear stress and make sure they understand.
2. For each fragment of the soap, ask students to describe what the cross-sections look like
3. Ask students to demonstrate tensional stress (pulling of the soap)
   1. This may be difficult, the soap was very hard and may not break from tensional force. In this case the student can think about why the soap is so hard to break and what properties would break the rock easier
   2. Discussion: Observe and describe the area where the soap broke. What is a real life example of tensional stress?
4. Ask students to demonstrate compressional stress (pushing the soap on the sides with hands, if not, trying to crush it)
   1. Discussion: Observe and describe the area where the soap broke. What is a real life example of compressional stress?
5. Ask students to demonstrate shear stress (trying to rub the soap with each other)
   1. Discussion: Observe and describe the area where the soap broke. What is a real life example of shear stress?
6. *Optional:* ask students to run a sharp edge of the soap under running water. Do they notice any changes? (simulation of weathering)

Vocabulary lists:

***rock***: A naturally-formed aggregate of mineral matter constituting a significant part of the earth's crust.

***compressional stress****:* When something is being pressed together. Causes a rock to shorten.

***tensional stress****:* When something is being pulled apart. Causes a rock to elongate, or pull apart.

***shear stress*:** When something is being pulled one way on one side, and the opposite way on the other side. Causes rocks to slip past each other.

***erosion***: Natural processes that wear away material. Includes weathering, dissolution, abrasion, corrosion and transportation.

***weathering:*** Breaking down of rocks, due to such things as water, wind, acid rain and plants.

Post-activity questions

**What would happen if you were trying to apply force to a rock instead of a soap? Would it be harder?**

**How would some of these stresses occur on a bigger scale in the natural world?**

**Why is it important to understand stress in rocks? What could be the real-world applications?**

**Do you think the stress we learned can be combined? What would happen if so?**

**Activity 2: Simulate rock cycle with starburst 3.45-4.00PM**

**\*students are advised to wash the soap crumbs off of their hands before this activity\***

Supplies provided: 8 starbursts, debris of soaps from activity 1, ziplock bag

Supplies needed: ruler, small bowl or cup or a hair dryer (optional for the igneous rock part)

Instruction:

1. Take 4 starbursts with different colors: red, orange, and pink
2. Use ruler to cut each starburst (act as sediments)
   1. It does not necessarily need to be cut, they can decide how much pieces they want it to be cut into
3. Compact the pile of starburst (Sedimentary rock). Let students describe what they look like and what they feel like.
4. Squash the ‘sedimentary’ starburst, try to roll it up and put it into ziplock bag
5. Apply more pressure and heat inside the ziplock bag by rubbing, compressing and molding it into different shapes (metamorphic rock)
   1. Let students explain how the shape changes in each step
6. Allow students to talk about how it looks different from ‘sedimentary’ starburst. What does the surface look like? What does the surface feel like? How do colors look different?
7. (Optional) Get a hair dryer and a bowl and put the ‘metamorphic’ starburst in, heat it until it melts and wait for it to cool down. (Igneous rock)
8. Let students feel the surface. How is it different from the previous two rocks?

Vocabulary lists:

*Igneous rock*

*Sedimentary rock*

*Metamorphic rock*

*Magma*

*Compaction and cementation*

*Melting*

*crystallization*

Post-activity questions

Ask students to draw the complete rock cycle, starting with blank paper. Remind them to include all the steps, and label all the arrows between the different parts of the cycle.

**Optional activity: Guess the type of rock (5-10mins) - ppt slide share**

**4.10PM: Reconvene the whole class, talk about the rocks they built**