**Ice Breaks Rocks Lab**

4th grade PSI

**Teacher’s Notes:**

- Students should complete this lab in pairs. This will reduce the amount of materials you need. In the “Before You Begin” section, there is space for students to write down their partners’ name. (You can choose their partner or let them choose, depending on what you think works best.)
- One third to one quarter of the class should be assigned to the group *room temperature*; the other one half to three quarters of the class should be assigned to the group *frozen*. The *room temperature* groups will leave their models out in the room overnight; the *frozen* groups will have their models left in the freezer overnight. This will provide a comparison the next day. You can choose how to best organize for students to divide their models into the different groups, whether the frozen group will actually put their models in the freezer or whether you will just have a place for them to put their models and you will put them in the freezer afterwards.
- On the second day, students will need to observe a carton from each group. The models that are frozen should have cracked plaster of Paris on Day 2, since the water expanded when it froze and cracked the surrounding “rock”.

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4th grade PSI

Lab Question
How does ice break rocks apart?

Before You Begin
What is mechanical weathering?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

How does ice break apart rocks?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Who is your partner for this lab?

________________________________________________________________________

What group have you and your partner been assigned to?
(circle)

frozen       room temperature

Purpose:
During this experiment, you will construct a model of mechanical weathering by ice. This model will help you to visualize more clearly the process of mechanical weathering that happens on Earth’s crust. In nature, mechanical weathering from ice can take many years. In this experiment, you will simulate this process over a much shorter time scale. This experiment will span two
class periods; the first day you will create your model, and the second day you will make observations.

Remember to answer Lab Questions during class while working on the lab. There are questions to be answered on both Day 1 and Day 2. Conclusion Questions should be answered after the lab is complete.

**Materials:**
- permanent marker
- small balloon
- plaster of Paris
- spoon and container to mix plaster of Paris
- empty cardboard milk cartons
- water
- freezer

**Procedure Day 1:**
1. Write you and your partner’s initials on the side of your milk carton with a permanent marker. Write a big F on the side if you are in the frozen group, or a big R if you are in the room temperature group.

2. Cut the top off the milk carton so you have an open box. Set aside.

3. Fill your balloon with water so it is about the size of a golf ball. Set aside.

4. Mix water and plaster of Paris until it is the consistency of pudding. (You may do this with other people in the class because it is easier to make a large amount at once.)
5. Fill your milk carton with plaster of Paris so that it is about \( \frac{3}{4} \) of the way full.

6. Take the balloon filled with a little water and push it down into the milk carton, holding it below the surface until the plaster sets enough so the balloon won’t rise.

7. If you are in the room temperature group, you will leave your carton out on the counter overnight. If you are in the frozen group, your container will go in the freezer overnight.

Lab Questions Day 1

1. What do you think the balloon with water in it represents in this model?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. What do you think the plaster of Paris represents?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. What do you predict will happen to your model overnight?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Procedure Day 2:
1. Find you and your partners’ carton. Observe what happened overnight.

2. If you were in the room temperature group, find a group with a carton that was in the freezer overnight and observe it. If you were in the frozen group, find a group with a carton that was at room temperature overnight and observe it.

Lab Questions Day 2
4. What happened to the room temperature model overnight?

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

5. What happened to the frozen model overnight?

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
Conclusion Questions

1. What does the balloon with water in it represent?
   _____________________________________________________________

2. What does the plaster of Paris represent?
   _____________________________________________________________

3. How is this model similar to mechanical weathering by ice in nature?
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

4. How is it different?
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
Ice Breaks Rocks Lab Answer Key

Conclusion Questions

1. What does the balloon with water in it represent?
   Water that gets into cracks in a rock

2. What does the plaster of Paris represent?
   A rock

3. How is this model similar to mechanical weathering by ice in nature?
   Water gets into cracks.
   Water freezes and expands.
   The ice causes the rocks to crack

4. How is it different?
   Water in a rocks’ cracks is not surrounded by a balloon.
   Cracks in rocks are usually smaller and harder to see.
   It takes much longer for ice to break rocks apart
   Ice is frozen for a whole season, not just one day.