**Lab: Baby Glaciers**

Making baby glaciers

To make you glacier, take a 1/2 gallon juice container with a plastic spout and, using the garden shovel, pour in the sediment mixture so that your container is about 1/4 to 1/3 full of sediment. If you are bringing your glacier home, then fill it with water, put it in your freezer, and don't take it out until right before leaving for school tomorrow morning. Also, make sure the carton is lying on its side with, the spout side facing up. Bring the carton to the classroom early tomorrow and I'll continue to freeze them in the school freezer or the cooler.

How long does it take a glacier to melt?

You will do this activity as homework in preparation for working with larger glaciers and larger concepts such as the Ice Ages.

1. Record the room temperature in which your ice cub will melt. _____
2. Remove an ice cube from your freezer and quickly measure its dimensions in *centimeters.*

Length _____ Width _____ Height _____

3. Place your ice cube on a paper towel and record the time of the melt in in the table below.
4. Predict how long you think it will take for your ice cube to melt entirely.

First prediction: _____

5. After several minutes, remeasure the ice cube and revise your predictions on the table. Repeat as necessary until the entire ice cube is melted.

| Time (minutes) | Prediction of melt time | Ice cube dimensions | General observations/sketches |
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Continue as necessary

6. Now that you have melted an ice cube, let's think about your juice-box glacier.
Based on your results, how long will it take for the ½ gallon–container glacier to melt?
Show calculations by determining the volume of the container. *(Hint: Think about volume/time ratio.)*

7. How long do you think a classroom-sized glacier would take to melt?

8. What about a school-sized glacier?

9. Your ice cube likely melted at room temperature. Think about the Earth's average temperature during the Ice Ages: It was (**colder/warmer**) than it is today. So what happens to the melt time of a glacier?

10. What must happen to the glacier as the Ice Age ends and the Earth's temperature starts to increase?

11. How is this change in Earth's temperature, or glacier-melting rate, measured by glacial geologists? What do you think geologists can look for to determine this (where can they go to look)?

Glacier density

Predict whether you think your baby glacier will sink or float in water. Why?

Prediction:

_____

1. Using the balance and counterweights, determine the mass of your baby glacier.

Mass: _____ grams

2. Measure your baby glacier's dimensions and calculate its volume.

Length: _____ cm

Width: _____ cm

Height: _____ cm

Volume: _____ $cm^3$

3. Now calculate the density of your baby glacier. Density = Mass/Volume. Show you work.

Density: _____ $g / cm^3$

4. Based on your calculations, should your glacier float or sink in water? Why or why not? Compare your results with your prediction.

Isostasy and rebound

1. Obtain a large, rectangular, damp (but not dripping wet) sponge. Measure the thickness to the nearest tenth of a centimeter (millimeter).
Sponge thickness: _____ cm

2. Place your baby glacier **lengthwise** on the sponge. Measure the thickness of the sponge again to the nearest tenth of a centimeter.

Sponge thickness: _____ cm  Change in thickness: _____ cm

3. Use a stopwatch to find the time it takes for the sponge to rebound to its **original thickness**. Remove the glacier and wait until the sponge returns to its original thickness by holding a ruler next to the sponge.
Time: _____

4. Calculate the **rebound rate**. Speed = Distance (change in thickness)/Time

5. Consider a continent-sized glacier sitting on North America for the better part of 10,000 years. It begins to melt and recede. How do you think your calculated rate compares to the actual rate of a continent rebounding after it was subjected to glaciers? Why?

6. Do you think the North American continent is rebounding as you do this lab? How do you think geologists go about measuring this rate? What types of instruments or equipment do they have to use?

7. Think about this: Your sponge was compressed and then *expanded upward* as the glacier was taken from the sponge…but did you see the sponge expand in an outward direction too? Could North America be expanding like your sponge? Why or why not? Explain.

Glacial features
We will now open up the containers and then proceed outside.

First, sketch what the bottom of your glacier looks like. Show where the pebbles, rocks, sand, and the ice are located. Try to make your drawing as accurate and to scale as possible. Sketch a side and bottom view.

Now, while one partner pushes downward and the other pushes forward, move your glacier across the sidewalk with firm but even pressure. Move your glacier about 2 m. Make observations of what you see on the sidewalk and on the glacier bottom. Sketch as necessary.

Sidewalk:

Glacier:

Repeat and record observations.

Sidewalk:

Glacier:

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Sidewalk:

Glacier:

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Sidewalk:

Glacier:

Repeat until the glacier breaks into pieces.

1. How long/far did you move your glacier before it broke (if it did break)?

2. What are the effects of glacial movement over a surface in terms of the ***erosional features*** that were left by the glacier? (What did the glacier create by eroding the landscape?)

3. What are the effects of glacial movement over a surface in terms of the ***depositional features*** that were left by the glacier? (What did glacier create by depositing sediment or other things?)

4. As the glacier started to melt, what was the color of the meltwater? Why do you think the meltwater was like that in appearance?

5. During the Ice Ages as the glaciers were melting, where did all this ice, water, and sediment end up? Present at least two options.

6. If all these glaciers are melting into water, predict what happens to sea level after the Ice Ages are over.