

## Glacier Lesson Plan

Many rivers in Minnesota were created by the glaciers that covered the state many thousand of years ago. When the glaciers moved they picked up rocks and soil from the land below. As the ice melted it formed many of the river channels that we have today, such as the Red, Rainy, St. Lois, Minnesota and other rivers and streams in Minnesota. Glaciers created much of the landscape that we are familiar with in Minnesota today. The remanents of these mountains still remain, in the form of large rocky outcrops and ragged cliffs on the North Shore of Lake Superior. The rolling hills near Alexandria are reminders that the glaciers scraped and scoured the landscape, producing moraines, a mass of rocks, gravel, sand, clay etc., carried and deposited directly by a glacier. It covered much of the state, moving a variety of directions, primarily north, south and east. As the glacier began to melt, it needed an outlet for the meltwater. This outlet is known as the Glacial River Warren and is basically the same channel used by the Minnesota River today. It is hard for us to imagine today the size and power of a glacier. In an attempt to better understand that process, our class will create mini glaciers.

1. Why does this land/area look like it does - flat, hills, marshes, lakes?
2. Point or find where we live on this map.

Lake Aggaiss to the North/Red River to Hudson Bay.

'97 Flooding - Red River covered great area.

Continental Divide in Stevens County near Donnelly.

Minnesota River

MN was covered by glaciers at least four times - about 3000 ft of ice covered Stevens County. (Morris Water Tower is 100 ft high - imagine 30 of them stacked up.)

Glaciers are:

- Large masses of moving ice (like block of ice cream)
- Formed when thick snow compacts into ice and begins to flow from its own work.
- Scrape the Earth like a bulldozer collecting broken bits of rock, river gravel clay (called till).
- Bedrock in Stevens County covered by till
  - 40-500 ft thick
  - Created hills, valleys, flat areas, lakes we see today.
  - At Stevens County Historical Museum - display of rocks, pebbles carried many miles.
  - Can track glaciers path by finding original source of rocks
    - Granite - MN
    - Shale - ND
    - Pegmatite - Canada
    - Limestone - Winnepeg, Canada
    - Shale - SD

Notice on the map two areas where Glaciers didn't touch SE MN Northshore Area.

(over)

### Activity

1. Tilt pan so they can see
2. Put ice cream block on pan and let it slide.
3. Crumble cookies and chips onto the baking sheet. These cookies represent glacial till, materials such as rocks and dirt that are picked up and moved by the force of the glacier. Glaciers front edge pushes rocks ahead of it-flattens land surface.
4. Remove ice cream from container and put it on top of the glacial till (cookies). Push in on top of crumbs and chips. The ice cream is our glacier. Show the students the marbling in the ice cream. Explain that as the glacier moves, it picks up dirt and rocks, thus becoming streaked with dirt. The swirls in the ice cream represent that dirt. Look at bottom of ice cream, do the cookies leave streaks? What happens to glacial till on cookies?
5. Put on plastic gloves and compact the ice cream by squeezing it. Have the students notice that the glacial till (cookies) begin to stick to the glacier (ice cream) or be pushed along. Explain to the students that pressure, like your compacting the ice cream, is occurring naturally due to snowfall and ice buildup. This process takes thousands of years in nature. Show rock to see scraping marks.
6. Ask students to observe the movement of the "glacier" and have them relate it to the way an actual glacier might have traveled.
7. Before they eat it note how crumbs are sticking to the glacier - see ripples in ice cream not clear ice and snow.
8. Divide the glacier into cups or bowls and let the students enjoy!

### Materials Needed

Chocolate Swirl  
Marble Ice Cream (1/2 Gallon Square) or Vanilla will work too.  
Cookies  
Coco Chips  
Cheerios  
Cups  
Baking Sheet (2)  
Spoons  
Napkins  
Plastic Gloves

### Objective

The learner will be able to observe how a glacier could have moved and shaped the landscape.  
Time : 20 - 30 Minutes

Adapted from "Always a River" for Educational use by Judy Johnston Stevens SWCD 6/27/02  
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