

# Towel Geology

## Teacher Demonstration

**Submitted by:** Dr. Barb Mieras

**Grade Level:** K-12

**Subject(s):** Science/Geology

**Duration:** 15 mins



**Description:** This activity can be placed under the category of *GeoArt*. *GeoArt* is based on the premise that by looking with both artistic and scientific eyes, people develop deeper and more personal geologic understandings. *GeoArt* programs use artistic approaches to promote critical thinking about geology and geologic processes.

**Goal:** To demonstrate a wide range of geologic principles and processes.

**Objective(s):** Wide range! Depending on specific demonstrations, students could be introduced to the following geologic principles and processes:

- Basic stratigraphy: the sequence of rock layers
- The formation of unconformities
- Folding, faulting, uplift, structure of basins and structural arches
- Erosion, canyon-cutting
- The reasons for the patterns of rock units seen on geologic maps
- Igneous intrusions
- Plate tectonics, subduction, rifting
- Regional and contact metamorphism

To get ready for your towel demonstration, collect two towels each of three or four different colors or patterns to represent different rock layers. Fold the towels to a convenient size and shape. Make two identical stacks of towels and set the stacks beside each other. (see the first illustration on Page 3 in *Forming the Flatirons* as an example).

You can add to the effectiveness of your demonstration (and often add

some humor, too) by choosing colors or patterns that will help your audience make connections to specific rock layer. For example, I use red towels to represent red rock layers in our area and kids' bath towels with a "ducky" pattern to represent marine rocks.

Your two stacks of towels will be your model. As you begin, be sure to clarify the scale of the model for your audience (is it your region? your state? your own backyard?) The following points are also worth emphasizing; you'll probably have others to add, depending on the purpose of your demonstration:

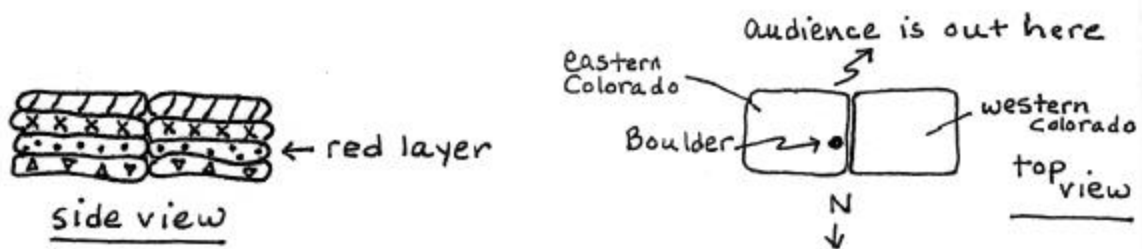
- ❖ The towels represent rock layer (you can reinforce this by actually sticking a small piece of the appropriate rock into the edge of each towel layer as you discuss it);
- ❖ The oldest rock layers will be at the bottom of the stack, and the youngest will be at the top (except for intrusions or impacts, which you'll explain as they come up... or down);
- ❖ The "ground surface" is represented by the top of the stack.

To show how Towel Geology works, here's one small example I've used over and over again:

### Forming the Flatirons

In the Boulder area, tilted red Pennsylvanian rock layers have eroded into steep flat-faced slabs leaning against the foothills. Because they resemble a row of antique irons, these slabs are known as the Flatirons. A popular question among groups of all ages is, "How did the Flatirons form?" This towel demo is designed to help people understand the general process. My stacks of towels include four "rock" layers. From oldest to youngest, they are: 1) Precambrian rocks; 2) the red rocks that today form the Flatirons; 3) rocks of the Cretaceous Seaway (a big deal here); and 4) post-Cretaceous rocks. I lay down the towel layers one by one, explaining the significance of each layer as I go. I emphasize that the red towels represent the Fountain Formation, formed by alluvial fan deposition along the Ancestral Rocky Mountains, and that these layers were later covered by younger layers. (I also make sure my audience understands that this is a "summary" stack; I've chosen just a few of the local rock units to make the model manageable.)

My complete stack of towels represents Colorado, with Boulder near the middle.



I take a "stroll" with my fingers across the top of the stack near Boulder and ask whether I can see the Flatirons (nope, the red layer is hidden by younger layers). Then what do I need to do in order to see the Flatirons? Often someone suggests digging down to the red rocks. I can do that, but when I get there, I discover a problem - although I can "see" the red rock layer, it's flat, not tilted up the way the Flatirons are.

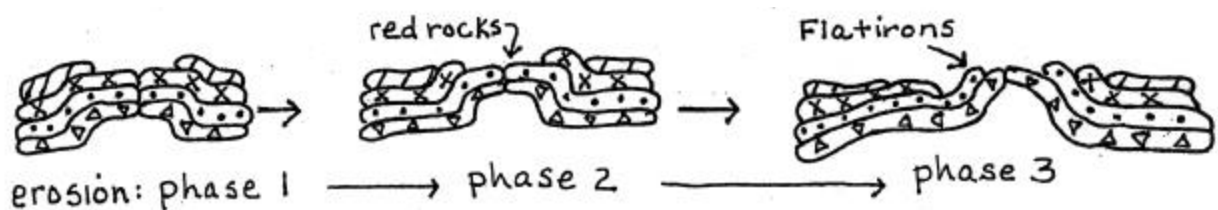


So what else do I have to do? Somebody always suggests bending or folding the rock layers. When I do that, by pushing the two stacks of towels together, the layers arch up in the middle of Colorado to form mountains. (This is a perfect opportunity to discuss the forces behind mountain building.)



but I still can't see the Flatirons as I walk around Boulder - the red rock layer still lies hidden beneath layers of younger rock.

What else need to happen? Erosion, of course, someone will say. I erode the younger rocks by slowly pulling back the top towels from both sides of the mountain while maintaining the tilt of the layers against the mountain flanks. The students tell me when to quit eroding the model. Usually they want me to stop as soon as the red towel is visible. But when I ask if the Flatirons go all the way over the mountains they realize that the red rocks need to be partially eroded, too. Once that's done, we're left with red rock layers leaning at a high angle against the mountains - our Flatirons.



It's important to review with the students what they've just seen; they should be able to explain the main steps in creating the Flatirons: deposition of relatively flat layers of sediment which were covered with younger layers and transformed to rock followed by later uplift, folding and erosion.

This demonstration is also useful in illustrating why we go to structurally high places to see older rocks when older rocks are supposed to be "at the bottom of the stack." It's also a good jumping-off place for discussing similarities and differences in stratigraphy on opposite sides of the range and for thinking about why flatirons form only in some places along the mountains.