

Sand Layer Deposition

Colorado is known for its amazing geology! You can create your own geologic model of Colorado's Front Range with a few items from our friends at ColoredSand.com! Everyone *loves* making bottled layers of sand, so we're going to take this classic activity and relate it to geology!

What You'll Need

Plastic bottles (<https://sandartsupplies.com/bullet-bottle-4-oz/>)

Funnels (optional - you can make one out of a scrap of paper)

Spoons (one per color of sand)

Geology Column example (<https://geology.com/time.htm>)

Geologic Cross Section Printout: (PDF LINK)

Colored Sand (<https://sandartsupplies.com/sand/>) - Colors listed below.

Directions:

1. Introduce the layering activity as an analogy to sedimentary geology
 - a. Sediment is more commonly known as sand, dirt, or mud. In certain environments, sediment can be blown or carried by water and laid down in layers. Finer mud grains will float around a bit before settling down, so this often means larger sand grains will settle down first making a layer of sand at the bottom.
 - b. As time passes, more and more layers stack up, like a stack of pancakes. Groups of layers that are of around the same age and from the same environment are lumped into Formations. A good example is the red layers at Red Rocks Park: sandstone with chunks of crystals.
 - c. This activity is going to focus on sand and how sand is laid down a little at a time, and how different formations can be stacked on top of each other because of the passage of millions and millions of years.
 - d. Using the pre-made example layers, show how it looks similar to a geologic column. Explain that geologists use this to understand how older rocks are found lower in the layers, and younger rocks are found higher in the layers.
2. Each layer of sand will represent a formation of local rock spanning 1.7 billion years of geologic time! Using the environmental pictures from Ancient Denvers, the Geologic Time Column, and the Geologic Cross Section, we can see how the layers in this bottle relate to the Colorado Front Range!
 - a. Bottom (first) layer: **Pink – Idaho Springs Formation, 1.7 billion years old**. This layer of pink sand represents the oldest rocks in Colorado. This was long before fish and other primitive animals had arrived. These rocks are the only ones on this list that are not sedimentary. These are igneous rocks – granite. It's made mostly of three distinct minerals: mica, shiny and flaky; feldspar, pink and purple crystals; and quartz, clear or white.
 - b. Next layer: **Red – Fountain Formation, 300 million years old**. This layer of red sand represents the formation that makes up Red Rocks Park (parts of Garden of the Gods, and even the Flat Irons). 300 million years ago was during the Paleozoic, the Era of time that happened before the Mesozoic, the age of dinosaurs. These layers were laid down by big rivers carrying tons of sediment from the eroding Ancestral Rocky Mountains, the mountain range that was here in Colorado BEFORE our Rockies. Giant salamanders,

sharks, primitive plants like conifers and ferns, and mammal ancestors like *Dimetrodon* lived 300 million years ago. (<http://bit.ly/33x3u3g>)

- c. Next layer: **White – Lyons Formation, 280 million years old.** This layer of white sand represents the sand dune layers of the Lyons Formation. These sand dunes formed just as the last of the Ancestral Rocky Mountains broke down and eroded away, and rivers and wind picked up the sand grains and turned them into dunes. Similar animals and plants from the Fountain Formation are found in these layers. (<http://bit.ly/2Wv5ac3>)
 - d. Next Layer: **Orange – Lykins Formation, 250 million years old.** This layer of orange sand represents the Lykins Formation, the first layer of rock we'll see today that was laid down during the Age of Dinosaurs – the Mesozoic Era. The Lykins is Triassic, from the first period of dinosaur time, and actually was laid down before dinosaurs were around. This part of Colorado was under a very shallow sea, and the orange layers are shale (mudstone), thin layers that settle to the bottom of the sea floor. The white crusty layers on top are actually fossil algae! We call these stromatolites. (<http://bit.ly/3agPrkU>)
 - e. Next Layer: **Brown – Morrison Formation, 150 million years old.** This layer of brown sand represents the Morrison Formation, the oldest layers of rock on Dinosaur Ridge and where our dinosaur bones and bulges are found. They were laid down in the Jurassic Period by rivers and ponds out in a desert-like floodplain. Dinosaurs like *Stegosaurus* are found in these rock layers. (<http://bit.ly/2U4Zt3i>)
 - f. Next Layer: **Yellow – Lytle Formation, 125 million years old.** This layer of yellow sand represents the Lytle Formation. These layers were laid down by rivers and wind creating large dunes and river deposits. A large amount of iron in the sediment is what gives it a yellow color. It sits on top of the. Dinosaurs like *Utahraptor* and tank dinosaurs were around at this time.
 - g. Next Layer: **Beige – South Platte Formation, 100 million years old.** This layer of beige/tan sand represents the South Platte Formation, the layers of beach sand where our dinosaur tracks are found. These layers were laid down by waves and tidal action next to the big seaway that split Colorado in half 100 million years ago. (<http://bit.ly/3b6wBgo>)
 - h. Top (last) Layer: **Black – Benton Formation, 92 million years old.** This layer of black sand represents the oil shale of the Benton Formation (or Benton Shale). Shale is thin layers of mud that settle to the bottom of the sea floor, and these thin layers trap microscopic creatures which with, over millions of year, become oil between the now hard rock layers. These layers can be very deep, deeper than a mile underground! Mosasaurs, plesiosaurs, ammonites, and clams are all found in these shale layers across Colorado. (<http://bit.ly/2UqoSDc>)
3. It's helpful to put a bit of glue inside the lid so that when you tighten it, it can't come loose, but that's optional.
 4. Compare your layers to the Geologic Cross Section - and you can color the cross-section to match the layers in the bottle!