



One way to help students understand the concept of geologic time is to have them make a time line. Using this time line, choose items that are most interesting, with one for each student. Have the students make separate index cards for each one of the items. They can list the item or event and the time when it occurred or they can draw a picture. You then choose a unit of measure for each unit of time. For example, if you choose one centimeter = one million years then the age of the Sandia granite: 1.5 billion = 1,500 million =  $1500/100$  cm (and million years) per meter = 15 meters of string! If you go back to the beginning of the Earth at 4.6 billion years ago: 4.6 billion = 4,600 million =  $4,600/100$  cm per meter = 46 meters of string! If you used 1 millimeter for each million years and go back to the formation of the Earth, you will need only 4.6 meters of string.

Have the students stand up with their cards and arrange themselves in order from most recent item or event to oldest. Go down the line and have them state to the class what they are and the time. Then pull out the string and have them measure where they belong on the time line. You can pre-mark the string at each meter/100 million years. The students should then stand at the proper place along the string.

### *A Few Questions for Discussion*

Were the Sandia Mountains here when dinosaurs lived here?

*The dinosaurs went extinct 66 million years ago. The rocks that make up the Sandias had been formed, but they did not rise into mountains until 5–7 million years ago.*

Are the Albuquerque volcanoes relatively old or relatively young?

*They are young in relation to the geologic history of the Earth.*

What things do we see together today that formed at very different times?

*The Sandia granite and the limestone of the Sandia Crest are next to each other on the mountain, but over a billion years of time is missing.*

What happened early in Earth's history? Why have we lost much of the record of it?

*There has been erosion and plate tectonic activity to change the surface of the Earth; we have a much better record of more recent events.*

# Geologic Time Line

ya=years ago; mya=millions of years ago; bya=billions of years ago

Era	Period		
CENOZOIC	QUATERNARY	12,000 ya	oldest known people in North America
		30–40,000 ya	modern humans first evolved: <i>Homo sapiens</i>
		150,000–1 mya	Albuquerque and Los Lunas volcanoes erupt; first bison in N. America
		1.1–1.6 mya	San Augustin Plain is a lake; Jemez Mountains (Valles Caldera) erupt
		1.6 mya	
	TERTIARY	1.5–2.5 mya	Rio Grande becomes a flowing stream; first mammoths in North America; Mt. Taylor erupts
		5–7 mya	Sandia/Manzanitas/Manzano/Los Pinos Mountains begin to form
		7–10 mya	Early Jemez Mountain eruptions
		10–20 mya	first bears; Sandias begin to uplift into mountains
		20–30 mya	Rio Grande Rift begins to form; Organ Mountains form; first camels
35–55 mya		first grasses; first horses; Sierra Blanca erupts	
60 mya		first primates; primitive mammals; Tijeras Canyon fault activated	
	65 mya		
MESOZOIC	CRETACEOUS	67–66 mya	extinction of dinosaurs, other species at Tertiary–Cretaceous boundary
		70–90 mya	rise and fall of <i>Tyrannosaurus</i>
		70–90 mya	rocks formed in Rio Puerco valley; most of New Mexico covered by ocean mosasaur, <i>Albertosaurus</i> , <i>Pentaceratops</i> ;
		100 mya	first flowers; ammonites abundant
		145 mya	
JURASSIC	150 mya	NM a muddy floodplain (Late Jurassic); first bird, <i>Archaeopteryx</i> ; <i>Stegosaurus</i> , <i>Allosaurus</i> , <i>Camarasaurus</i> , <i>Seismosaurus</i>	
	170 mya	NM a “sand sea” similar to the Sahara (Middle Jurassic),	
	200 mya		
TRIASSIC		<i>Coelophysis</i> (NM state fossil); first mammals and dinosaurs; phytosaurs, aetosaurs, <i>Placerias</i>	
	250 mya		
PALEOZOIC	PERMIAN		<i>Dimetrodon</i> ; red sandstone deposited in northern NM
		290 mya	
	PENNSYLVANIAN		first reptiles; first seed plants; Crinoids (sea lillies); Madera Limestone (currently Sandia Crest) formed at bottom of ocean covering part of NM
		320 mya	
	MISSISSIPPIAN		shallow reefs cover New Mexico; Crinoids proliferate
		355 mya	
	DEVONIAN		first amphibians
		415 mya	
	SILURIAN		first insects; first land plants and land animals; scorpions
		440 mya	
ORDOVICIAN		early jawless fishes	
	495 mya		
CAMBRIAN		first fish; trilobites and brachiopods	
	545 mya		
PRECAM-BRIAN	PRECAM-BRIAN	1.5–2 bya	formation of granite in Sandia and Sangre de Cristo Mountains
		3.2–3.8 bya	oldest known rocks on Earth; oldest known fossils
		4.6 bya	Earth and other planets in our solar system formed