42 Timelining

How Old Is Old?

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Pre-Visit Activity
1st Grade

Materials and Equipment:

Each group of two or three students will need:

Approximately 15 objects, including photographs, natural history items, historical artifacts, and geological specimens. For example:

- A baby picture or picture of self
- A fresh flower
- News clippings
- An antler or skull
- A cross-section of wood from a tree
- A seashell
- An antique photo
- Pre-1945 rusty tools or household items
- An old book
- A picture of an ancient pyramid
- A picture of a dinosaur
- A layered rock (sedimentary)
- A volcanic rock (igneous)
- Clay
- Sand
- A coarse-crystalline rock
- A fossil plant
- A fossil invertebrate

Butcher paper or other roll of paper

Focus:

An understanding of geologic time has two aspects: duration and chronology. Students' understanding of duration builds on what *short time* and *long time* may mean or their notions of *old*. Their grasp of chronology is revealed by how they apply the concepts of *before* and *after* in arranging objects by age in a single line. This arrangement constitutes a time line.

The concept of age in the context of geologic time may refer to either its durational or chronological aspects. By grouping or spacing objects on a time line to reflect notions of short time, long time, and very long time, students both develop and reveal their grasp of duration. A sense of duration appropriate to historical and geological time is, of course, difficult for students to acquire.

Their grasp of chronology, on the other hand, is developed and revealed by how they arrange objects in a line to reflect a sequence of events. The position represents the time when the object was made and is selected based on the students' notions of *before* and *after*.

If these concepts of duration and chronology are combined, spacing on the line may represent duration. Some students may even suggest that each previous position stands for an event two, several, or even 10 times as long ago as the one after it. Keep in mind that geologic time is so vast compared with the average human life span, or even with recorded history, that a time line in which equal space stands for equal time would be unmanageable.

In this activity students arrange a set of objects from oldest to youngest. This encourages them to think about past periods of time in terms of both duration and chronology (sequence), and gets them to articulate clearly the many degrees of meaning in the word *old*. In doing so, they lay a foundation for acquiring a meaningful conception of geologic time.

Use larger groups or the whole class to discuss the completed time lines. The best insights will emerge from comparisons of different arrangements. This activity has no single, correct solution. Do not be concerned with misconceptions or misinformation about the scale of geologic time in an absolute sense of millions, tens of millions, or hundreds of millions of years. Focus on the more important goals: the development of serial ordering skills, construction of categories of past time, and knowledge of how objects may record information about events in time.

Challenge:

How would you arrange objects and pictures representing your life in relation to geological and historical events? What clues do you use to decide how old an object is? How will you represent different lengths of time?

Time: 30 to 45 minutes

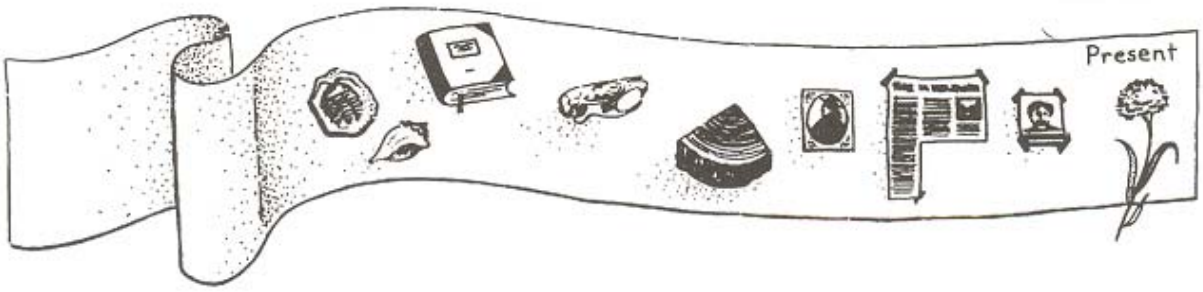
Procedure:

1. Ideally, each student would have his or her own three-meter-long roll of butcher paper to arrange the objects on, but groups of two or three can work together.

2. Introduce all objects in the collections by asking students if they know what the objects are. If an object proves very puzzling and is clearly unknown, discard it. Accept reasonable disagreement over the identity of an object (multiple interpretations are fine); for example, students might not recognize a woodworker's planing tool or the imprints of a frond of a fossil fern. Instruct students to be careful in handling antiques and any precious photographs.

3. Ask the students which object in their set they believe to be the oldest. Discuss their choices (accepting several possibilities) as a way to clarify what *oldest* may mean. You may need to tell the students that the age of an object should be thought of as the time since it was made. Otherwise, they may think a fossil is quite recent because "someone may have found it just yesterday."

4. Ask which object might be considered the youngest. Now, have the students place these objects at opposite ends of the paper.



5. Have the students put their baby pictures at a place on the paper they wish to represent the time of their birth. Point out that the length of the line from that picture to the end

labeled "Present" stands for their age. Write students' birthdays on the paper, and then ask them how they would space objects on the rest of the line to indicate different amounts of time.

6. Most students will need some guidance at this stage. A first step is to make two groups of objects: young and old. The students can, in turn, split each new group in two and continue refining the arrangement. If deciding on a single series in time for their objects is too frustrating for them, accept partial solutions; for example, arranging the objects in categories such as recent, old, and very old.

Primary grade students may consistently place the baby picture at the beginning of the line. Some will make all time segments equal in length with respect to their birth. A few intermediate and upper elementary grade or middle school students will quickly grasp the problem of representing hundreds or millions of years on the scale used for the 10 years or so standing for their age. As a solution, have them make equally spaced marks going back in time stand for increasingly larger amounts of time. Some students may indicate that each interval may stand for twice the amount of time as the previous one. Others may suggest tenfold intervals—six steps to a million years ago.

Confusion inevitably arises over what the words *age* and *old* may mean to individual students. For example, one student may imagine that a fossil must be very old. Another may decide that the fossil animal probably lived for only a few years and therefore should be categorized as young. Students in the early grades will think about the age of geologic specimens in many, seemingly inconsistent, ways: a rock may be young because it broke off from a boulder yesterday or volcanic rock from a recent flow may be old because it came from an old volcano. Working through these confusions to shared understanding will be of great value.

7. Depending on the ages of the students, you may conclude the activity by discussing the following:

- Reasons for considering objects as young or old
- Divisions between objects from a short time ago, a long time ago, and a very long time ago
- Categories of past time based on how objects were grouped prior to arranging them in sequence
- Criteria for deciding relative age
- Estimates of amounts of past time