

Geologic history – relative age dating:

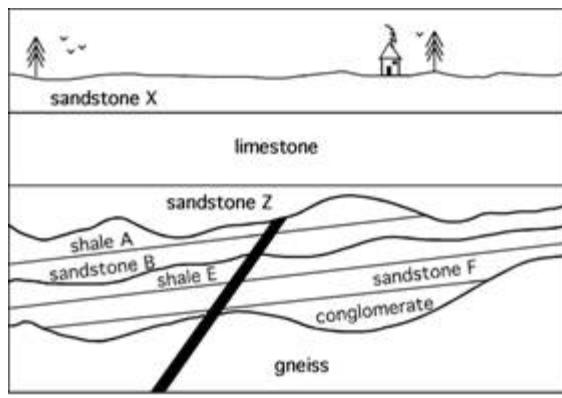
Usually this exercise is associated with a cross section or profile in which there are a series of stacked rock units composed of sedimentary, igneous, and/or metamorphic rocks as well as structures such as faults and folds (anticline, syncline) and unconformities (nonconformity, angular unconformity, disconformity). This type of exercise applies the principals of relative age dating you studied in the text to deduce the order of geologic events. Please review the 5 principles before you start the exercises. In this type of exercise list the oldest event at the bottom of the page and progresses upward to the youngest event.

The question that many people have is where do I start?

It is useful to identify the unconformities which represent breaks in the geologic time record. Usually in this type of exercises an undulating wave line indicates an erosional surface. Remember, in order to form an erosional surface like an angular unconformity, disconformity or in some cases a nonconformity, the rock units have to be uplifted or the oceans levels fall so the rock is exposed at the surface of the Earth before they can weather and erode. If you have subsequent deposition of marine sediments (limestone, shale and sandstone) then the land mass must subside or the oceans rise to cover the surface by water before you can have deposition of sediments. Remember that the rocks were deposited originally on a horizontal surface (or nearly so) so if they are no longer horizontal then something had to happen to them. If they are not horizontal but tilted then there was a period of uplift or deformation causing tilting; or if they are bent/folded then there was a period of deformation causing folding. Nonconformities can also be formed as a result of an igneous intrusion into sedimentary or metamorphic rocks.

Example:

cross-section view



	Youngest
angular unconformity	Period of uplift to the surface and erosion forming modern day surface Deposition of sandstone X Deposition of limestone Oceans rise followed by deposition of sandstone Z Period of uplift to the surface and erosion Period of deformation causing tilting of rock units A fracture or fault forms and fluids carrying silica precipitate quartz vein Deposition of shale A Oceans rise followed by deposition of sandstone B Period of uplift to the surface and erosion Deposition of shale E Deposition of sandstone F Deposition of conglomerate
disconformity	Deposition of shale A Oceans rise followed by deposition of sandstone B Period of uplift to the surface and erosion Deposition of shale E Deposition of sandstone F Deposition of conglomerate
nonconformity	Oceans rise followed by deposition of conglomerate Period of uplift to the surface and erosion Gneiss forms Oldest event

Suggestions:

One can use unconformities and structures to subdivide the cross section. If there is an unconformity then work on the oldest event up to that unconformity because this represents a break or a gap in the rock record. In this way you may compartmentalize what appears to be a very complex problem into smaller and more manageable parts. Work on only a small part of the cross-section's geologic history then find the next higher unconformity and work on the events between the two unconformities. You will join the unconformities by linking them with periods of uplift and erosion followed by ocean rising and deposition of sedimentary rocks (if the rocks are marine in origin).