

Study Questions: Geologic Time

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The quiz about geologic time will involve questions like the ones that follow.

Note: Whenever you see reference to *Tarbuck*, in the following questions, that means the eText of the textbook by Tarbuck and others, **Earth** References to the Lab Manual correspond to the AGI/NAGT **Laboratory Manual in Physical Geology** [12th edition].

1. What is the best current scientific estimate for the age of the universe -- the time since the Big Bang? (see <https://www.baylor.edu/geosciences/index.php?id=953452>)
2. What is the best current scientific estimate for the age of the Earth? (see <https://www.baylor.edu/geosciences/index.php?id=953452#earth>)

Relative Dating

3. What is the name of the relative-dating principal that says that, in an undeformed sequence of sedimentary strata, the oldest layer is on the bottom?
4. What is the name of the relative-dating principal that notes that sedimentary beds are originally deposited in horizontal or near-horizontal layers?
5. What principle used in relative dating allows us to determine the age of a sedimentary rock stratum by recognizing the characteristic set of fossils contained within the stratum?
6. When a fault or a dike cuts across a layer, what principle of relative dating allows us to state that the layer must be older than the fault or dike?
7. What principle of relative dating takes note of the fact that a piece of rock that is incorporated within another rock, as in a xenolith in a granite or a pebble in a conglomerate, must be older than the rock that it is part of?

Contact Relationships

8. What do we call a sedimentary contact between layers deposited during continuous sedimentation in a layered sequence of sedimentary strata?
9. A significant interruption in rock-forming processes results in an apparent "gap" in the rock record. One example is along the formation contact between the 1.75 billion year old Vishnu schist and the early Paleozoic strata (~550 million years old) at the bottom of the Grand Canyon. What are these discontinuities called, in general?
10. What type of contact involves a tilted or inclined (dipping) sequence of sedimentary strata below an erosional surface on which was deposited a younger sequence of sedimentary strata?
11. What type of contact occurs when younger sedimentary strata are deposited on an erosional surface of older igneous or metamorphic rock?
12. What do we call a contact along an erosional surface between older sedimentary layers and younger sedimentary layers when all of the layers are parallel to each other?

Major Events in Earth History and the Geologic Time Scale

13. What eon in Earth's history extends from the coalescence of Earth from the solar nebula to the first fossils of organisms that had hard parts like bones or shells, between ~4.6 billion and 542 million years ago? *Hint:* Examine Figure 9.25 in the eText of Tarbuck and others **Earth** for this and the next answer.
14. What eon in Earth's history extends from the age of the first fossils of organisms that had hard parts to the present, since 542 million years ago?
15. What era in Earth's history extends from the age of the first fossils of organisms that had hard parts to the greatest mass extinction in the past billion years, between 542 and 251 million years ago? *Hint:* Examine Figure 8.13 in the Lab Manual for this and the next few answers.
16. What era in Earth's history extends from the greatest mass extinction in the past billion years to the smaller mass extinction that finally doomed the dinosaur, between 251 and ~65 million years ago?
17. What era in Earth's history extends from the extinction of most dinosaurs to the present, since ~65 million years ago?
18. What geologic eon are we living in today? *Hint:* Examine Figure 9.25 in the eText of Tarbuck and others **Earth**
19. What geologic era are we living in today?
20. What geologic period are we living in today?
21. About how old is the oldest fossil evidence of life on Earth? *Hint:* Examine Figure 8.12 in the Lab Manual and the associated text.
22. About how old are the oldest fossil mammals?
23. Our best current understanding, based on fossil occurrences and DNA evidence, is that humans evolved in Africa. The oldest fossils of our species, *Homo sapiens*, that we have discovered to date are about 200,000 years old. During what *period* of the geologic time scale did these earliest *Homo sapiens* live? *Hint:* Examine Figure 8.13 in the Lab Manual, which is based on the most recent [IUGS geologic time scale](#)

Working With Ages Expressed in Years

24. What is a dating technique geologists use to find the age of geological material expressed in the approximate number of years before present?
25. What do we call the isotope that decays to produce another isotope? That is, what was the original radioactive isotope called?
26. What do we call the stable product of the radioactive decay of an isotope?
27. How much of the original radioactive material is left as a radioactive isotope after an amount of time equal to one half life has passed?
28. Do all radioactive isotopes decay at the same rate?
29. With the exception of beryllium, are the decay constants used in geological dating actually constant, or are they changed by external fields or forces?
30. What is the stable daughter product of the decay of potassium-40?
31. Under normal circumstances, how old a specimen can be dated using the carbon-14 method?
32. What does a good potassium-argon date tell you about the potassium-bearing mineral grain?