

Multiple Choice Questions: These questions are drawn directly from the “Review Questions” at the end of each chapter in our historical geology textbooks. The answers to these questions are on p. 437 of the textbook.

Short Answer Questions:

- Why does the Universe contain elements other than hydrogen, helium and lithium (and perhaps beryllium) formed during the Big Bang?
- List the three major layers of the Earth starting with the surface and descending to the center.
- What are the three plate boundary types?
- The three major types of plate boundaries are convergent plate boundaries and what other two types of plate boundaries?
- Magma is produced at which type(s) of plate boundary (circle all that apply): convergent, divergent, transform.
- List two geologic features associated with an oceanic-oceanic convergent plate boundary.
- What are the three major types of rock produced by natural processes on Earth?
- How can you tell the difference between a carbonate rock (limestone) and a similar-appearing clastic rock?
- What are the three major types of rock produced by natural processes on Earth?
- Define: biological evolution (one bonus point for using 10 words or less).
- What is the raw material of evolution (i.e., what **must** exist within the interbreeding individuals of a population of a species if evolution is going to occur)?
- An analysis of feldspar using ^{40}K - ^{40}Ar radiometric dating reveals that 75% of the parent isotope (^{40}K) has decayed into the daughter isotope (^{40}Ar). If ^{40}K has a half-life of 1,300,000,000 years, what is the age of the feldspar?
- Rock A and Rock B both contain the radioactive isotope ^{238}U , which radioactively decays into ^{206}Pb with a half-life of 4.5 billion years. Based on the ratio of uranium to lead in the two rocks, Rock A retains 87% of its original ^{238}U while Rock B retains only 75% of its original ^{238}U . Assuming that radioactive decay is responsible for the missing uranium, which rock is older? [Rock A or Rock B] (circle your answer on the answer sheet)
- An analysis of feldspar using ^{40}K - ^{40}Ar radiometric dating reveals that 50% of the parent isotope (^{40}K) has decayed into the daughter isotope (^{40}Ar). If ^{40}K has a half-life of 1,300,000,000 years, what is the age of the feldspar?
- Rock Z contains the radioactive isotope ^{40}K , which radioactively decays into ^{40}Ar with a half-life of 1.3 billion years. Based on the ratio of potassium to argon, Rock Z contains 25% of its original ^{40}K . Assuming that radioactivity is responsible for the missing argon, how old is Rock Z?
- Two zircon grains are analyzed using ^{238}U - ^{206}Pb radiometric dating, yielding the ratios of parent isotope (uranium) to daughter isotope (lead) in the table below. Which zircon grain is older?:

	^{238}U	^{206}Pb
Zircon A	12%	88%
Zircon B	32%	38%

- Two zircon grains are analyzed using ^{238}U - ^{206}Pb radiometric dating, yielding the ratios of parent isotope (uranium) to daughter isotope (lead) in the table below. Which zircon grain is older?

	^{238}U	^{206}Pb
Zircon A	91%	9%
Zircon B	68%	32%

- What is the raw material of evolution (i.e., what *must* exist within a population of living, interbreeding organisms if evolution is going to occur)?
- Two completely identical clams die off the coast of South Carolina. One is eventually preserved as a fossil, while the other is not. What is the single most important post-mortem event that allowed the first clam to be preserved as a fossil? Explain (briefly!).
- True or False: Microbial mat communities went extinct at the end of the Archean Eon.
- What do experiments like the Miller-Urey Experiment reveal about the formation of organic compounds in the Archean Eon?
- Why is Hadean "Eon" not an actual geological eon?
- There are several lines of evidence that life existed as early as 3.7-3.8 billion years ago on Earth. Describe one.
- Name any two supercontinents.
- What two EONS have we studied since the last exam (make sure both are eons!)
- Briefly explain Lynn Margulis's theory of endosymbiosis. Do not write a novel, just the basic idea.
- What do experiments like the Miller-Urey Experiment reveal about the formation of organic compounds in the Archean Eon?
- What is a "terrane" as the term is used in the study of plate tectonics?
- What is the "small shelly fauna" and when does it appear in the fossil record?
- Why is the claim to fame of the Chengjiang genus *Myllokuningia*?
- What geological event led to the development of the Iapetus Ocean?
- The taxon Sarcopterygia includes the lobe-fin fish taxon and what other taxon?
- What evolutionary development separates amniotes from other tetrapods?
- What does the loss of coal and reefs along with the re-occurrence of stromatolites in upper Permian and lower Triassic rocks indicate about the Permian/Triassic extinction?
- What skeletal feature separates *Morganucodon* (the first true mammal) from mammal-like reptiles?
- List the four orogenies of the Mesozoic in North America from oldest to youngest.
- The Drake Passage was the result of the separation of what two continents?
- List any two modern taxonomic groups that originated during the Mesozoic.
- List two characteristics shared by ALL modern mammals.

Essay Questions: Each essay must be an essay, not a list of sentences. Assume that you are writing for someone who knows nothing about the subject matter. Your essay will be graded based on content, syntax and spelling. You will lose points if I cannot understand what you have written.

In a well-written essay, examine data that has been cited as supporting the theory of plate tectonics. Explain how data from:

1. Paleobiogeography
2. Regional Geology
3. Paleoclimatology

support the theory of plate tectonics. For each of the three kinds of data, you must:

1. Describe the data (what had been observed).
2. Explain why this was an anomaly in the paradigm in which the Earth's continents don't move
3. Explain how the data supports the theory of plate tectonics.

The essay must be an essay, not a list of sentences. Assume that you are writing for someone who knows nothing about plate tectonics. Your essay will be graded based on content, syntax, grammar and spelling. You will lose points if I cannot understand what you have written.

In a well-written essay, summarize the geologic history of the continent that we now call North America during the Paleozoic. Your essay must include all of the following events:

The Acadian, Antler, Alleghanian/Ouachita and Taconic orogenies
The assembly of Laurasia, Laurentia and Pangaea continents and loss of the Iapetus Ocean
The Absaroka, Kaskaskia, Sauk and Tippecanoe transgressions

You must include the relative age dating of each event (in which geologic periods each occurred and how are they related to each other in time) and what caused each event. Your essay must be written in Standard English as an essay, not a list of phrases. Please use the back of the answer sheet for your essay. If you need more paper, please ask.