

Final Take-Home Exam

This exam has four main questions, each with several parts each. You must work independently. Your answers should be your own ideas, but the ideas and data can be taken from the literature. You should use a computer to put the materials together. Each answer should be no more than 3 pages, exclusive of figures. You can use figures from the lecture notes or other presentations, or from published materials, only be sure to cite your sources. The parts where you are asked to draw cross sections should be done by hand, however. You should use a 10 hour limit as a guide in completing the exam, but this is just a guide. There will be no class on April 27 and 29, so you can use that time in your exam preparation. The final product is due in class on May 2.

1. Discuss the geologic history of western USA during the time interval starting at the Cambrian and ending after the Antler Orogeny. Include specific evidence from the sedimentary rock record, tectonic elements, and igneous activity to support your story.
 - a. Give the global relationships of the North American Plate that are important in leading to the first of the main orogenies of the western cordillera.
 - b. Draw a cross section along a line connecting the current locations of San Francisco and Denver showing the main elements of the Antler Orogeny. Use a vertical scale that allows an adequate definition of the base of the crust and the tectonic faults. Show as many tectonic elements as you can.
 - c. What major geologic events were happening in South America around the time of the Antler Orogeny?

2. The formation of the Sierra Nevada Batholith perhaps represents the time of greatest concentration of igneous activity in the Western Cordillera. Describe the in the main tectonic elements which were active at this time, giving as much detail as you can.
 - a. Give your explanation for the formation of the huge batholith during this Orogeny. Include the global plate relationships as well as local conditions that were favorable.
 - b. Explain the origin of the Franciscan formation and draw a short cross section from the Coast Range through the Sierra Nevada to show the relation of the Franciscan to the Great Valley Sequence and the Sierra Nevada. Your lecture notes give several possible interpretations, pick the one you like and give some supporting evidence.
 - c. Is there a batholith in the South American Cordillera of comparable age that corresponds to the Sierra Nevada? Explain why or why not one exists.

3. The Laramide represents a significant change in the pattern of tectonic activity, basin formation, and igneous activity. Describe the major features of the Laramide Orogeny and explain the causes for these features.
 - a. Specifically, what is the signature characteristic of igneous activity in the Laramide that is distinctive and what is its cause.
 - b. Draw an E-W cross section from the west coast through the Black Hills illustrating the main tectonic features of the Laramide Orogeny. Make the section deep enough to show the position of the subducted plate beneath the craton.
 - c. What global tectonic pattern could have caused the changes that led to the Laramide tectonic and igneous pattern?
 - d. Give an example from South America in which similar tectonic patterns developed by analogous mechanisms. In the South American case give the causes for this tectonism.

4. The Cenozoic of western USA records a major change in tectonic, sedimentary, and volcanic elements that reflect major changes in plate relationships. Give a brief description of the major features/events and give an explanation for their causes.
 - a. The Great Basin is a very distinctive feature in the Cordillera. Explain its history and the main factors in producing the tectonic pattern and igneous activity.
 - b. Draw a cross section from San Francisco to Denver represent the present configuration of tectonic and volcanic elements. Show the crustal thickness and the areas where there is presently volcanism.
 - c. The pattern of volcanism in the Cenozoic changed systematically from the end of the Laramide to the present. Describe this change and explain why it happened.