SCI 3402

Name (yours:)

Exam 1

1. (15 pts. total) Fill in the blanks! Use one letter per blank and don't skip any blanks. Use the letters that I've included as clues. When you're done, the *first letters of each answer*, read downwards, will give you the answer to this question:

What's the full name of the Danish geophysicist who used seismic waves to discover the Earth's inner core?

| T | The Mercalli scale measures the of a quake. |
|--------|--|
| É D | Two words: A cloud of hot gas and ash that rolls rapidly down the side of a volcano |
| I | Cirques, horns, moraines, and U-shaped valleys are all created by |
| N | The point on the Earth's surface that's directly above an earthquake's focus |
| E | Fine windblown dust |
| S | Rhyolite, andesite, and basalt are all |
| S | Block of crust thrust upwards, often forming a mountain range in places like Death Valley |
| H | Boundary between the crust and the mantle |
| C | Mount Magazine is an elongated upward fold in the crust, also known as a/an |
| M | Fault in which the footwall is pushed up relative to the hanging wall |
| _0 | Have you ever had a better Earth Science class than this, yes or no? |

And the name of the Danish geophysicist who discovered the Earth's inner core, one of the most famous women in the history of geology, was

ANSWERS: intensity, nuée ardente, glaciers, epicenter, loess, extrusive, horst, Moho, anticline, normal, no; Inge Lehmann.

2. See the separate handout for this one. (45 pts.)

NOTE: This involved writing an essay on plate tectonics—and then exchanging essays with other students and writing a critique of another student's essay. This was kind of an experiment; it's not exactly standard operating procedure for an exam, and I wasn't really satisfied with the way it turned out. I probably won't do that again. . . but the bottom line remains that y'all need to know plate tectonics backwards and forwards.

Now that you've done that, answer any two of the following five questions. Each questions should require a paragraph of two. Be concise, yet detailed and informative. Grammar, spelling, punctuation, and style all count. (20 pts. each.)

3. You are working for a home insurance company. Three clients all apply to you for a homeowner's insurance policy. All three persons have well-kept homes worth about \$500,000, in nice neighborhoods. Mr. Abshire's house is a four-bedroom, three-bath split-level in a posh suburb east of Seattle, Washington. Mrs. Bell's home is a Kona coffee plantation (very tasty and rather expensive gourmet coffee) on the Big Island of Hawaii. Dr. Callahan's house is on a ranch outside of Tonopah, Nevada, right next to a large cinder cone that locals just call "The Crater". Use your knowledge of geology to decide who should pay the highest insurance premium. Clearly explain the reasons for your choice.

ANSWER: Abshire is close to a stratovolcano; they're prone to the most violent eruptions, so he should pay the highest premium. Bell is on a shield volcano, which erupts more fluid lava without being nearly as explosive. Callahan is next to a cinder cone volcano; such volcanoes form, stop erupting, and then never erupt again.

4. In the 1910s, a German scientist named Benno Gutenberg discovered the existence of the Earth's core. Obviously, he didn't visit it in person—no one ever has. How did he work out that it existed, and what evidence did he use? Give as many specific details of his work as you can.

ANSWER: Basically, he used the properties of how seismic waves are transmitted through the Earth. Go look up the details.

5. List two physical features in the state of Arkansas whose formation can best be understood using plate tectonics. Explain how each feature formed, and how plate tectonic theory provides an explanation for it.

ANSWER: I can think of two obvious ones. The Ouachitas are a fold-belt range. The Delta and the New Madrid Fault formed when the crust subsided along a failed rift, or aulacogen. Other answers are possible.

6. How do Milankovic cycles work? How is the theory of Milankovic cycles used to explain global climate change?

ANSWER: They've got to do with regular, gradual shifts in the Earth's orbit and revolution. Being a bit rushed right now, I think I'm just going to say "look it up!"

7. The Ruby Mountains of northern Nevada were covered with ice until recently. The Spring Mountains, outside Las Vegas, are equally tall and majestic, but they never were ice-covered. However, both are part of the Basin and Range topography of the western United States. Suppose that you could visit both of them. What would the two mountain rainges have in common? And how might they be different?

ANSWER: The Ruby Mountains would be expected to have U-shaped valleys, and possibly hanging valleys, glacial cirques, horns, and maybe moraines; the Spring Mts. wouldn't have those. But they're both big blocks of crust that have been uplifted and tilted (i.e. horsts).

SPECIAL SECRET BONUS QUESTION: What's the specific name for the bluish-brown variety of granite that can be seen alongside Interstate 530/US Highway 65-167, starting at mile marker 1 just south of Little Rock and continuing for a few miles southward?