

Study Guide for Exam 1

Review Session: Monday 3-5 pm in the lab room

Practice Exam 1 is posted on the class web site.

This is most useful as a tool to find out (1) how I construct tests, and (2) how well you know & can apply the material. The specific questions on the practice test are not the same questions on the test you will take in class. What you need to find out is if you have the material organized in your head in a way that you can access. Also, not all topics are covered on this practice test. For example, this quarter we discussed origin of life hypotheses, extremophiles, tsunamis... that were not covered the quarter this practice test was given.

Tina's Top-10 Study Tips: also posted on the web site. Suggests strategies for making your learning more active and your test-taking more effective overall. That document explains different ways that test questions can be constructed to test more than just rote memorization, and gives several sample questions to demonstrate. Here are a couple study tips, excerpted for the Top-10 document...

General study tips:

- Study as if you were studying for an essay test. You know you learn more that way!
The test will be mostly multiple choice format, perhaps one or two short answer/short essay.
- If you grasp the overall concepts, the details will fall into place. Don't ignore the details, but understand the processes first.
- Pay attention to the geographic distributions of the phenomena we discuss in class. I feel strongly that you should get familiar with the world -- what happens where???
- Organize your notes, map out the info, look for connections...
 - consider cause and effect
 - apply a concept or principle to a new scenario
 - do some problem-solving
 - make comparisons (look for patterns of similarities and differences)... there is a page at the end of this study guide that will help you organize a lot of info in this way.

Bring to the Exam: sharp #2 pencils
(I will provide mark-sense forms.)

What's on the Exam: (course content up to and including lecture/lab Th April 15th
Material from lectures and student discussions, videos*, handouts, homework, reading assignments in the text (ch. 1-3) & lab manual (Ex. 1 and 2).
(Videos shown in class are placed on reserve in Odegaard Library Media Center)*
Format is mostly multiple choice, but I may have a couple short answer/short essay questions also.

Prologue: Interesting but not covered on test.

Scientific Method: though this is not detailed in the text, we spent considerable time the first two weeks talking about HOW scientists know what they know. What is the difference between a HYPOTHESIS and a THEORY? How do you test hypotheses? What is a CONTROL? Review your lecture notes of our discussion of the film *Dive to the Edge of Creation*. What were the major points made in this film? How does the geosphere, hydrosphere and biosphere interact at hydrothermal vents? How is the biosphere supported nutritionally? Review the focus questions for this film. We discussed the hypothesis & evidence that hydrothermal vents are the type of environment where life on earth originated. You will have to depend on your lecture notes for this info.

Related topics: 2.7,17.6; 13.6; p.407; extremophiles; origin of life hypotheses; astrobiology; symbiosis;

Ch. 1: In lecture and lab we cover most of ch. 1. You should know the time frames of the 4 major geologic eras (see GEOLOGIC TIME SCALE on Handout 2 for a simplified summary). We discuss a few important numerical statistics which you should know (e.g. % of earth covered by ocean; deepest point in the ocean; 1 minute of latitude = 1 nautical mile). However, I don't expect you to memorize tables of numbers (Tables 1.1, 1.3, 1.4). What are the GEOSPHERE, HYDROSPHERE, ATMOSPHERE & BIOSPHERE? Know the HYDROLOGIC CYCLE. What does it do? Why is it important? Maps will be covered - review your lab book/homework 1; navigation skills, including map reading (COORDINATES, BEARING, DISTANCE), PROJECTIONS, RELIEF, CONTOURS, etc.

[Not covered: While you should know that we can date rocks using radiometric dating, you don't need to memorize the specifics (half lives, etc); Natural Time Periods p.35-38-- we'll use this info later in the course, but not on this test; section 1.3; Longitude and Time p.41;"sphere depths" p.51]

Ch. 2: What are the layers that make up the earth? How do we know what & where they are? In which layers does convection occur? Which is the source of magmas for mid ocean ridges? for hotspots? Which generates the magnetic field? Which are rigid? What is ISOSTACY? PLATE TECTONIC THEORY: you should know the major features & processes associated with the 3 TYPES OF PLATE BOUNDARIES. What causes sea floor spreading? How fast is it along the major mid ocean ridges? What causes MAGNETIC ANOMALIES? Look at Fig. 2.22 in the text and be sure you know where the major plates are. What is the relationship between age of the seafloor and its depth? What are EXOTIC TERRANES? What geologic activity do we have in the Pacific Northwest? We talked about earthquake hazards in various areas (see class notes)...what factors determine how much damage occurs? We discussed tsunamis in some detail. What causes them? How fast do they move in the open ocean? in coastal water? How does the form of the wave change when it enters shallow water? The case study of the Sumatra tsunami provides a vivid demonstration. What are HOTSPOTS and what do they tell us about plate motions? What other evidence do we use to model the motion of lithospheric plates? As for pre-Pangaea evolution of the ocean basins, concentrate on the points made in class and don't worry about the details in the text. As for the future, based on what has happened in the past, can you predict what will happen to the Atlantic & Pacific Oceans, Mediterranean, East African Rift, Red Sea, Persian Gulf, & Baja California? Which ocean basins are getting larger? which are closing up? HYDROTHERMAL VENT communities are covered in this chapter.

[Not covered: Polar wander curves p.67 & 69); Listening to Sea Floor Spreading p.80-81, Undersea Robotic Technology p.88-89... interesting but not covered on the test]

Ch 3: How do we know what the sea floor looks like? (see Bathymetrics p.108-109). You should know how each of the BATHYMETRIC features was formed and, if applicable, how it fits into the plate tectonic scheme of things. For example, in this chapter the authors define the "typical" continental margin profile (continental shelf, shelf break, slope, rise...), but in Ch. 2 they explained that continental margins may look different depending on whether or not they are on a plate boundary (see p. 79 for definitions of PASSIVE vs. ACTIVE CONTINENTAL MARGIN and the connection to tectonics). How does the geometry of these two types of continental margins differ? Which ocean basin is surrounded mostly by passive continental margins? Which is surrounded by mostly active continental margins?) What are the kinds of sediments? and what information can sediments give us about changing climate, tectonic regime, distance from continents, biological productivity? (see also section 15.1, plankton...these are the organisms most commonly fossilized in deep sea sediments). What do we learn about the evolution of the Caribbean Sea and Central America by looking at sediments? How did tectonic changes in Central America affect the populations of organisms that lived in the Caribbean and in the Pacific to the west? Coral atolls are covered in this chapter. How do they form? We'll spend a little time in class talking about coral reef ecosystems & atolls in connection with hotspots. You'll need to depend mostly on class notes for this info.

What sediments does the text discuss that are potential resources? Even if we don't get to talk about all of these in class, you should read about Oil & Gas*, Manganese Nodules*, and Sulfide Mineral Deposits* (p.125-127).

[Not covered: 3.4 Seabed Resources, except those mentioned above (*).]

Geographical Places & Features

In this course we make extensive use of maps & charts to demonstrate the geographic relationships of important features related to the oceans. By the first midterm we will have discussed all of the places listed below, and you are shown their locations in lecture. The most important thing, of course, is to know WHY they are important, so I have listed them according to category to help you remember.

Oceans & Seas

Pacific
Atlantic
Indian
Southern
Mediterranean Sea
Gulf of Mexico
Caribbean Sea
Gulf of California
Red Sea
Persian Gulf

Ancient seas

Panthalassa
Tethys

Hotspots

Yellowstone
Hawaiian-Emperor Chain
French Polynesia
Iceland
Tristan da Cunha
& Walvis Ridge
Ninetyeast Ridge
Comoro Islands

Tectonic Plates

Pacific
North American
Juan de Fuca-Gorda
Caribbean
South American
Indian-Australian
African
Arabian
Eurasian

Plate Boundaries:

Convergent

• *present*
Aleutian Trench & Aleutian Islands
C. America/Middle Am. Trench
Andes/Peru-Chile Trench
Japan/Japan Trench
Mariana Trench & Challenger Deep
Java-Sumatra Trench
Tamboro, Krakatoa, Toba
Cascadia convergent zone
Cascades: Rainier, St. Helens, Mazama...
Olympic Mountains
Thera-Santorini
Himalayas/Mt. Everest
Persian Gulf

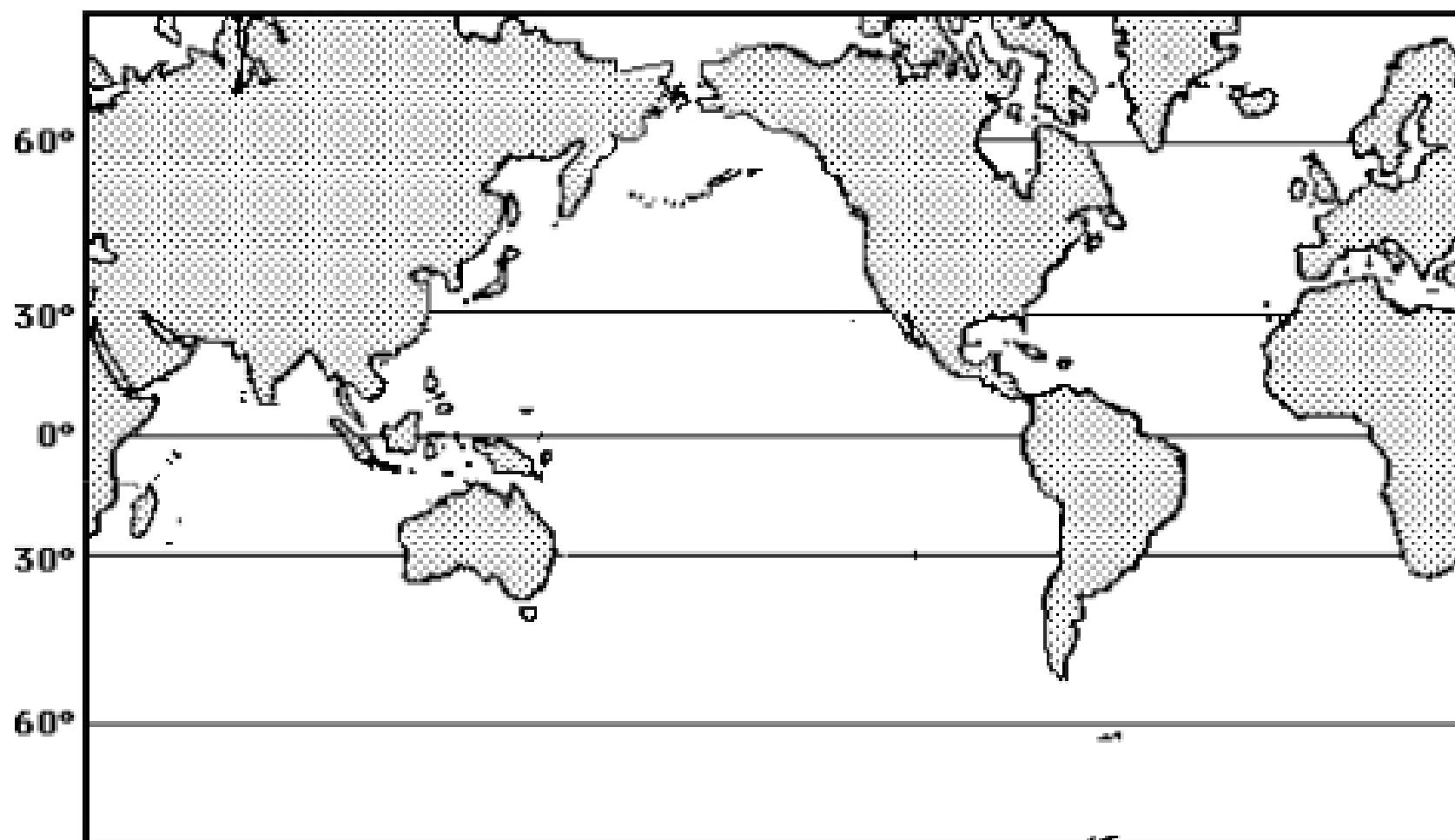
• *past*
(old continental collision)
Appalachian Mtns.
Atlas Mts (NW Africa)
Caledonides (Scotland/Scandinavia)
Alps
Rocky Mountains

Divergent

Mid Atlantic Ridge
Galapagos Rift
East Pacific Rise
Juan de Fuca-Gorda R.
Gulf of California
Central Indian Ridge
East African Rift (cont.)
Red Sea / Gulf of Aden
Lake Baikal (cont.)

Transform Faults

San Andreas Fault
Queen Charlotte Fault
Caribbean Transform



On the following page is a study device that works very well to help organize what may seem like a lot of material. Try to summarize on one sheet of paper the important info about each of 4 major tectonic environments. This will allow you to build a framework to compare and contrast these environments. *Past experience shows that students who take time to do this have done significantly better on Exam 1 than students who do not.*