

EES 1 – Natural Disasters & Earth Resources

Exam 1

September 24, 2008

1 Instructions

- The exam comprises 30 multiple choice questions, 10 short answers and 2 figures. All questions must be answered.
- It covers Chapters 1 to 4 in the book and Lectures 1 to 4.
- This take-home exam can be taken as a group by **up to three** students. Taking the exam alone is accepted. However, no particular reward or grading indulgence should be expected for it.
- Each group or person will have to deliver one scantron for the multiple choice questions (Form #882-E), the completed figures, and one computer-generated copy for the short answers in class on **October 7, 2008**. No exceptions!
- I suppose that some of you will turn to the Internet rather than the book or the slides for the answers, thinking that it will be easier. However, if I have the tiniest suspicion that your answer is someone else's answer, I will check it. If I find that you have plagiarized, you will be immediately reported to the appropriate office on campus. I will then follow up with whoever is in charge of plagiarism to get your sweet bottom in the most serious trouble for your **misconduct**.
- Should any problem arise with the questions, please email me at mathieu@csufresno.edu.

2 Multiple Choice Questions (2 pts. each)

1. From choices below, the best estimate of the age of the Universe is about _____ years old
(a) 4.7 billion (b) 14 billion
(c) 6 billion (d) 15 billion
2. Most asteroids inhabit the “asteroid belt” between the planets _____
(a) Earth and Mars (b) Jupiter and Saturn
(c) Mars and Jupiter (d) Neptune and Pluto
3. Subduction zones occur at _____ plate boundaries
(a) transform (b) divergent
(c) convergent (d) both b & c

4. The Earth has _____
 - (a) A solid Fe inner core and a liquid Fe outer core
 - (b) A solid Fe inner core and a liquid sulfur outer core
 - (c) A liquid Fe inner core and solid Fe outer core
 - (d) A solid nickel inner core and a liquid Fe outer core
5. The crust is approximately how thick?
 - (a) 100–200 km
 - (b) 1–2 km
 - (c) 500–1000 km
 - (d) 5–70 km
6. Which of the following elements is more abundant in the Earth's crust as compared to the Earth as a whole?
 - (a) iron
 - (b) magnesium
 - (c) nickel
 - (d) silicon
7. Ninety percent of the Earth is made up of which four elements?
 - (a) iron, oxygen, silicon, and magnesium
 - (b) oxygen, nitrogen, hydrogen, and silicon
 - (c) magnesium, aluminum, silicon, and oxygen
 - (d) silicon, calcium, aluminum, and iron
8. The Earth's major layers include (from outermost to innermost)
 - (a) inner core, outer core, mantle, crust
 - (b) outer core, inner core, mantle, crust
 - (c) crust, mantle, outer core, inner core
 - (d) crust, outer core, inner core, mantle
9. Earth's surface is protected from solar wind and cosmic radiation by _____
 - (a) Earth's gravitational field
 - (b) Earth's magnetic field
 - (c) Earth's magnetic force
 - (d) Earth's magnific field
10. Heat transfer that occurs through the movement of a fluid, driven by temperature differences among various points within the fluid, is termed _____
 - (a) radiation
 - (b) convection
 - (c) conduction
 - (d) adhesion
11. An aurora is produced when _____
 - (a) solar wind particles are directed toward the poles and excite atmospheric gases
 - (b) swamp gases rise upwards from the Arctic tundra
 - (c) radiation in the Van Allen belts can be seen on a clear, cold night
 - (d) lighting travels from cloud-to-cloud rather than cloud-to-ground
12. As compared to the rocks that make up the Earth, the crust as a whole is _____
 - (a) considerably more dense
 - (b) slightly less dense
 - (c) considerably less dense
 - (d) about the same density
13. The lithosphere is composed of the _____
 - (a) crust only
 - (b) crust, mantle, and outer core
 - (c) mantle and the uppermost part of the core
 - (d) crust and the uppermost part of the mantle
14. Tectonic plates consist of _____
 - (a) continental lithosphere only
 - (b) oceanic or continental lithosphere or both
 - (c) oceanic lithosphere only
 - (d) either oceanic or continental lithosphere, but not both

15. The two most common elements in the crust of Earth are _____
 (a) iron and calcium (b) oxygen and hydrogen
 (c) magnesium and manganese (d) oxygen and silicon
16. As compared to the asthenosphere, the lithosphere is _____
 (a) cooler and less able to flow (b) hotter and less able to flow
 (c) cooler and more able to flow (d) hotter and more able to flow
17. The apparent tendency of the north (or south) magnetic pole to vary in position over time is termed _____
 (a) dipole (b) polar reversal
 (c) magnetic declination (d) polar wander
18. Regions of the sea floor with positive magnetic anomalies were formed during times when Earth's magnetic field _____
 (a) was exceptionally strong (b) had normal polarity
 (c) was exceptionally weak (d) had reversed polarity
19. Evidence for a united Pangaea comes from the fossil record of which type(s) of organisms?
 (a) plants (b) freshwater animals
 (c) large terrestrial animals (d) all of the above
20. Marine magnetic anomalies result from sea-floor spreading in conjunction with _____
 (a) intermittent magnetic anomalies (b) magnetic anomalies from the core
 (c) magnetic polarity reversals (d) apparent wander of the magnetic poles
21. The oldest basalts on the ocean floor are about _____ years old
 (a) 20 million (b) 200 million
 (c) 4.3 billion (d) 250 million
22. The primary difference between lithospheric and asthenospheric mantle that gives rise to numerous divergent patterns of physical behavior, is _____
 (a) temperature (the lithosphere is cooler than the asthenosphere)
 (b) chemical composition (the lithosphere is mafic, and the asthenosphere is felsic)
 (c) chemical composition (the lithosphere is felsic, and the asthenosphere is mafic)
 (d) physical state (the lithosphere is solid, and the asthenosphere is liquid)
23. Mid-ocean ridges are _____
 (a) convergent plate boundaries (b) divergent plate boundaries
 (c) strike-split plate boundaries (d) transform plate boundaries
24. Summed over the entire surface of Earth, _____
 (a) the rate of lithospheric production at ridges is greater than the rate of lithospheric consumption at subduction zones
 (b) the rate of lithospheric consumption at ridges is greater than the rate of lithospheric production at subduction zones
 (c) the rate of lithospheric consumption at subduction zones is equal to the rate of lithospheric production at ridges
 (d) the production rate and the consumption rate cannot be calculated with enough accuracy to answer that question
25. When two bodies of continental lithosphere are pulled together at a convergent boundary, the result is _____
 (a) collision and mountain formation (b) a divergent plate boundary
 (c) a volcanic island arc (d) subduction

26. Tectonic plates consist of _____
 (a) either oceanic or continental lithosphere, but not both
 (b) oceanic lithosphere only
 (c) continental lithosphere only
 (d) oceanic or continental lithosphere or both
27. The volcanoes of the Cascades Mountains are related to melting of rock associated with a _____ plate boundary.
 (a) divergent
 (b) convergent
 (c) transform
 (d) subduction
28. Iceland is one of the few places in the world that is both above sea level and situated atop a _____ plate boundary.
 (a) divergent
 (b) convergent
 (c) transform
 (d) subduction
29. At a subduction zone, the downgoing (subducting) plate _____ plate boundary.
 (a) is always composed of continental lithosphere
 (b) is always composed of oceanic lithosphere
 (c) may be composed of either oceanic or continental lithosphere
30. The pulling forces that produce the most rapid plate velocities are concentrated at _____.
 (a) ocean trenches
 (b) mid-ocean ridges
 (c) stable continental interiors
 (d) continental collision zones

3 Short Essay Questions

1. Describe the steps in the formation of the Solar System. (4 pts.)
2. If you made a model of Earth's spherical shape that was 10cm in radius, how high would Mount Everest rise above sea level? (Show your mathematical steps) (2 pts.)
3. Was it ever possible for a dinosaur to walk from Fresno, CA to Marseille, France? Explain your answer and include some evidence. (4 pts.)
4. Did drilling into the seafloor contribute further proof of sea-floor spreading? If so, how? (2 pts.)
5. Describe the three types of plate boundaries. (2 pts.)
6. If the coastlines across the Atlantic Ocean are spreading apart, why is not the Atlantic Ocean deepest in its center? (2 pts.)
7. Explain the processes that form a hot spot. (2 pts.)
8. Dating methods indicate that the oldest rocks on continents are almost 4 billion years old, whereas the oldest ocean floor is only 200 million years old. Why? (2 pts.)
9. Some predict that your home state will sink into the ocean. Is this idea consistent with the theory of plate tectonics? (2 pts.)
10. Fill in the missing words on Figure 1. (6 pts.)
11. Fill in the missing words on Figure 2. (6 pts.)

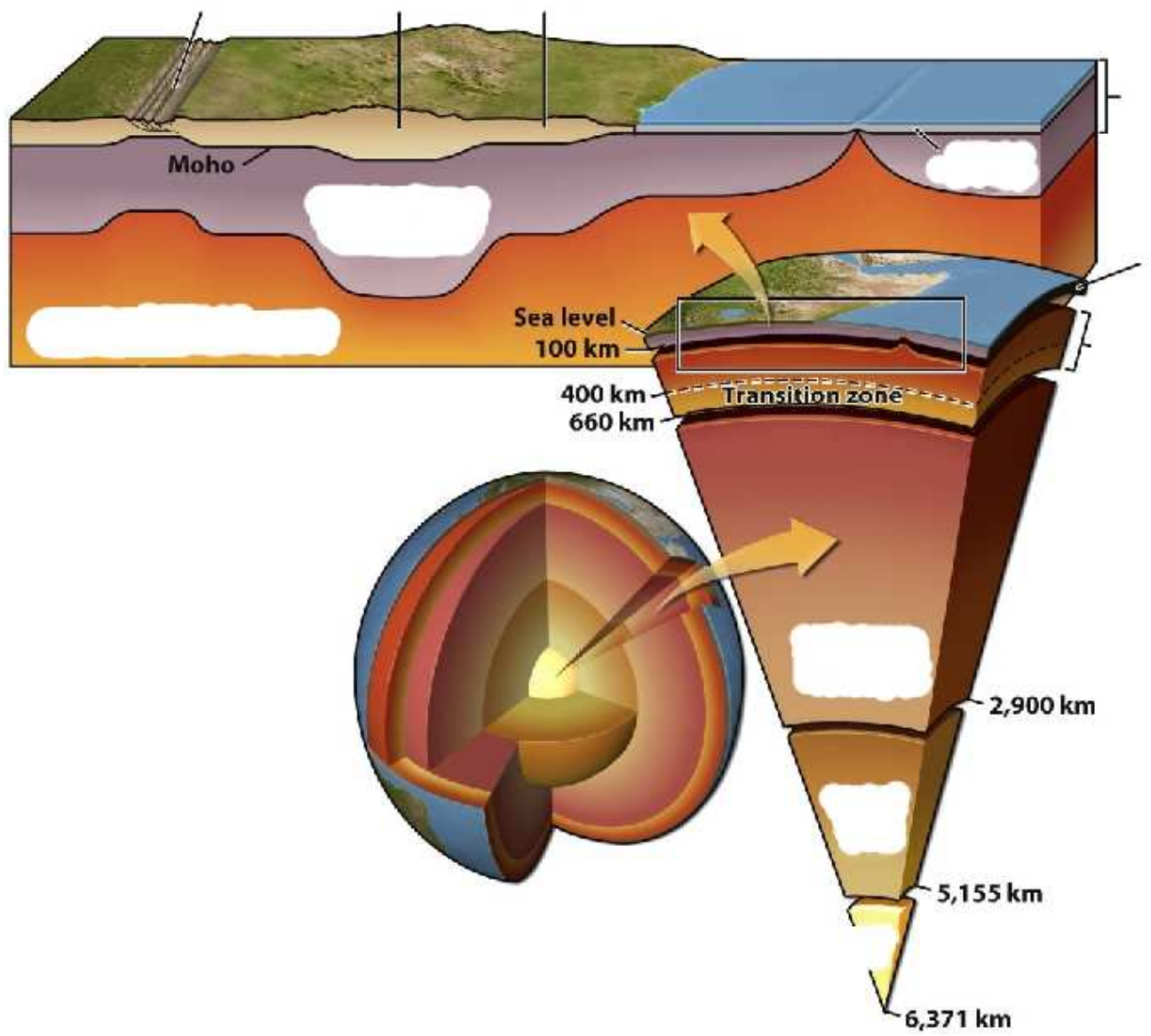


Figure 1:

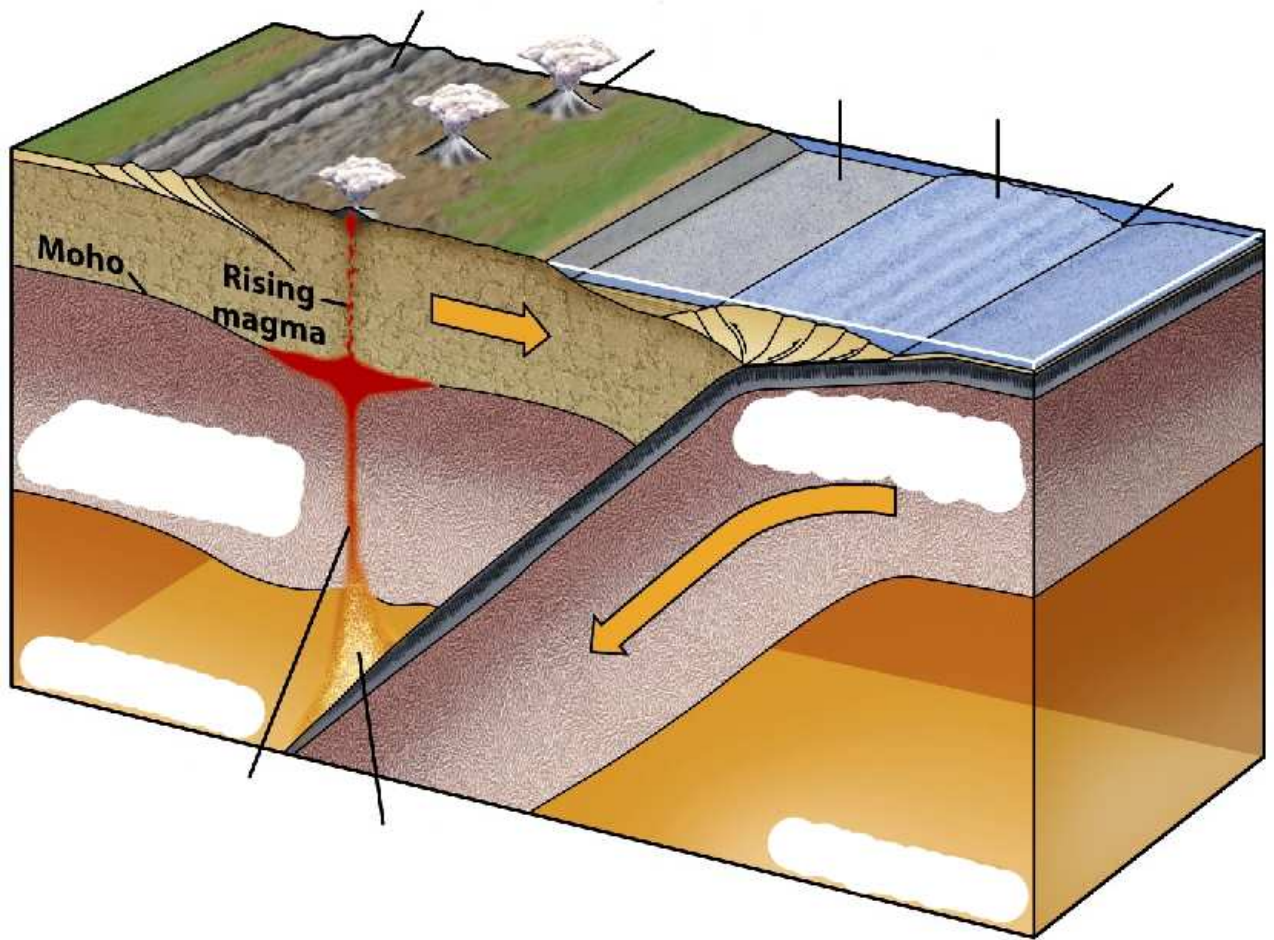


Figure 2: