EXAM III REVIEW – GG101 Dynamic Earth

Use complete sentences and sketches to answer each question below. The more information you can provide the better!

History of Geology

1. What caused the growth of the Nile River Delta over time? How is the delta growth related to the development of population centers and agriculture along the length of the Nile?
2. How do we know the direction of first motion along the Dead Sea Transform earthquake of 740 AD? How did this earthquake destroy two of Egypt's most important cities?
3. What three fundamental principles or laws of sedimentary geology is Nicolaus Steno famous for? Describe the significance of each one.
4. How did Comte de Buffon know that the Earth had to be older than 75,000 years old by studying the White Cliffs of Dover?
5. Explain the "Principle of Uniformitarianism."
6. Use the Principle of Cross-cutting Relationships to identify the sequence of events occurring in Figure 18.8 of your book (p. 423).
7. What is a sedimentary unconformity? Describe the sequence of events needed to create this feature. What does an unconformity imply about geologic time?
8. Describe how stratigraphic correlation can be used to map large areas of sedimentary rock?
9. Describe how the Galapagos' giant tortoises helped Darwin to understand the concept of species evolution? What does evolution imply about the age of the Earth?
10. What are two reasons that the discovery of radioactivity was important to the study of geology?

Geologic Timescale

11. What six common attributes define life on Earth today? Between a virus and a bacteria which one represents a life form and which one does not? Why?
12. What unique aspects of our planet Earth are conducive to supporting life (as we know it)?
13. In what kind of environment did life on this planet probably originate? What was unusual about these life forms that allowed them to survive on early Earth?
14. What two factors favor fossil preservation? Describe how?
15. Describe the organization of the Geologic Timescale? What defines each interval? What defines the boundaries between intervals?
16. Describe three fossils that we talked about in class and explain how they are useful for understanding past environments?
17. What catastrophic event caused the demise of the dinosaurs? What fundamental change in Earth's systems is responsible for ALL mass extinctions?
18. What distinctive rock do you find associated with meteorite impacts? How did it form?
19. What four factors have influenced human evolution? What climate phenomenon has influenced human evolutionary patterns?
20. How are humans modifying their natural environment today? What past interval in Earth history may provide useful insight into the response of Earth to human-induced climate change, and why?

Folds and Faults, Mountain-building

21. What four factors control rock deformation? Describe how?
22. Describe how geologic ages can be used to distinguish between a syncline and an anticline?
23. What is the origin of the domes and basins mapped in the central continental United States? What 2-dimensional fold type does a dome resemble? What 2-dimensional fold type does a basin resemble?
24. Plot the stress/strain relationship that describes ductile deformation. Plot the stress/strain relationship that describes brittle deformation. Which corresponds to folding? Which corresponds to faulting?
25. What kind of stress regime does a reverse (or thrust fault) imply? How does the length of a reverse-faulted layer change in response to deformation?
26. What kind of stress regime does a normal fault imply? How does the length of a normal-faulted layer change in response to deformation?
27. Describe the stress regime of a strike-slip fault? What is the direction of displacement along a strike-slip fault?
28. Describe three common joint types and the processes that lead to their formation?
29. What are the three types of mountain-building and what kinds of faults are associated with each?
30. What type of stress regime is associated with each of the three types of mountain building? Describe how these stress regimes are related to plate tectonics?

Earthquakes and Tsunami

31. Along what type of plate boundary do the vast majority of the world's earthquakes occur? What is the second most common location? What is the third most common location?
32. Describe the ductile and brittle deformation phases associated with a subduction earthquake. What are two reasons why these earthquakes are so dangerous?
33. Describe the sedimentary evidence for great subduction earthquakes in the Pacific Northwest. What event/environment does each of these sedimentary layers correspond to?
34. What is the origin of the drowned old growth tree stumps along the Oregon Coast?
35. What information can sand boils and overturned buildings give you about the earthquake-resistance of a soil? Should you build there? Describe protective measures that can be taken if you do decide to build there?
36. What are the three different types of seismic waves recorded by a seismograph? Which of these travels fastest, which travels slowest? How can these waves be used to determine the distance to an earthquake epicenter?
37. What are the three commonly-accepted scales that describe earthquake intensity? Describe the strengths and weaknesses of each method?
38. What is the most common tsunami-generating event? Describe the physical process that displaces water to start the tsunami?
39. How do the wavelength, velocity, and wave height of a tsunami wave change as it approaches a coastline?
40. What early warning sign along a coastline is evidence that a tsunami is fast approaching? How has this phenomenon actually led to many tsunami-related deaths? What should you do in Hawaii in the event of a local earthquake?