EXAM I REVIEW – GG101 Dynamic Earth

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

Universe/Galaxy/Solar System

1. What is the 2-part definition of the "Universe"?
2. As scientists, why are we only interested in studying the "observable" universe?
3. Describe what is meant by "galactic Red Shift".
4. What two pieces of information did Edwin Hubble use to calculate his constant for the rate of cosmic expansion?
5. Explain in words and with an equation how Hubble's rate of cosmic expansion can be used to derive the age of the universe.
6. Describe the "Big Bang."
7. What two lines of evidence confirm the expanding universe model?
8. If all galaxies in the universe are moving away from each other, what shape does the universe have to be, and how is that shape changing over time? Does the universe have an edge?
9. What is the name of our galaxy? Describe its shape.
10. Describe the origin of our solar system (i.e. Solar Nebula Hypothesis.)
11. The collapsing solar nebula segregated into two regions, what were they?
12. Describe the process of planetesimal accretion.
13. What caused our young sun to suddenly begin producing heat and solar wind? How long did this process probably take?
14. Which planets are the inner, rocky planets? Which planets are the outer gas giants?
15. What caused the differences between the inner rocky planets and the outer gas giants? Is this mechanism still happening today?
16. What is the new definition of a planet? Based on the new definition of a planet, why is Pluto no longer a planet?
17. What celestial body contains 99% of our solar system's mass?

Early Earth

18. How was Earth's Moon probably created?
19. What four heat sources caused Earth's entire mass to be molten during early Earth history?
20. Describe the "Iron Catastrophe". What effect did this have on Earth's internal structure? What effect did this have on Earth's atmosphere?
21. What were probably the two primary sources of Earth's modern atmosphere prior to life on Earth?

Plate Tectonics

22. On a diagram of Earth's internal structure, label each layer. Indicate whether the layers are solid or liquid or both.
23. Draw a simplified convection cell. Indicate heat source and direction of flow. What drives convection?
24. Describe the effects of convection in Earth's outer core. How does convection in Earth's outer core protect us from harmful solar flares?

25. Draw a simplified version of convection in Earth's mantle. Identify and label the parts of the convection cell that correspond to these features on Earth's surface: spreading ridges, subduction zones, hot spots.
26. What process and what force probably drive plate tectonics?
27. Describe how we can calculate absolute plate motions.
28. Describe four types of evidence Alfred Wegener used to support his hypothesis of "continental drift."
29. Describe three additional discoveries that support the Theory of Plate Tectonics.
30. What are the three types of plate tectonic boundaries?
31. How were subduction zones identified? What does the angle of subduction tell us about the age of the descending plate?
32. Which plates (young or old) produce the largest earthquakes? Why?
33. Describe the geologic processes associated with: 1) seafloor spreading, 2) continental rifting, 3) oceanic-continental subduction, 4) oceanic-oceanic subduction, 5) continental-continental subduction, 6) oceanic transform faults, 7) continental transform faults.
34. Describe the landforms you would expect to find at each of the above locations.
35. On a plate boundary map, label locations where you would find each of the plate boundary types above.

<u>Minerals</u>

36. What three types of particles make up an atom? What are their masses relative to each other? What are their electrical charges?
37. Describe three ways in which the Periodic Table is organized?
38. Based on what we learned about valence electrons, why do MOST elements in the periodic table prefer to exist in combination with other elements?
39. Describe an ionic bond?
40. Describe a covalent bond?
41. Of the eight elements that make up the Earth's crust, why are the light ones the most abundant? Why are the ones with nearly-full valence electron shells most abundant?
42. What are eight physical properties that can be used to identify minerals in the field (i.e. without access to analytical equipment). Give one example of why a single physical property may not provide all the information needed to identify a mineral.