

## Exam #2 Study Guide Questions

Below are questions that go with the notes we discussed in class. You do not need to answer these questions, as they will not be collected. These are intended to help you see if you understand the content that was discussed in class. The exam will only be 50 questions, and they will not be these exact questions. I hope you find these helpful.

### Weeks Five and Six: Earth's Interior/Structure

1. Where is the most/intermediate/least dense material on Earth, and why are these materials located in these regions?
2. What process formed the Earth?
3. What process formed the layers of the Earth's interior? Why does this separation occur?
4. The structure of the Earth can be described by composition or by physical properties. What are Earth's compositional layers? What are Earth's layers by physical properties.
5. Compositionally, what is the outermost layer of the Earth?
6. What is the outermost layer of the Earth based on physical properties?
7. Which layer of the Earth is composed of low density rock? High density rock? Higher density metal?
8. How does temperature and depth affect the behavior of material composing the Earth?
9. What are the two types of crust, and what are their average thicknesses?
10. Which type of crust is more dense? Less dense?
11. Of what type of rock is oceanic crust mainly composed? Of what type of rock is continental crust mainly composed?
12. What area of a continent would be the thickest?
13. What is lithosphere? What are its physical properties?
14. Which layer(s) of the Earth composes the plates?
15. What is the Mohorovicic Discontinuity (Moho)?
16. Which layer of the Earth's interior is near its melting temperature and is therefore hot and pliable, having plastic flow?
17. At what rate does the asthenosphere flow? At what rate do the plates move?
18. Which layer is the site of magma generation?
19. Where is the mesosphere? What are its physical properties?
20. What process is causing the plates to move?
21. What would we see where convection currents are descending?
22. What is the boundary between the mantle and outer core?
23. The Core is comprised of what materials?
24. What are the names of the cores two layers, and why do we separate them into two layers if they are comprised of the same materials?
25. Within which layer is the Earth's magnetic field generated?
26. How do we know what the interior of Earth is like?
27. Which type of seismic wave cannot pass through fluids?
28. What causes P & S wave shadow zones?

## Weeks Seven and Eight: Continental Drift, Paleomagnetism, and Plate Tectonics

29. Who was the first strong proponent of continental drift? What does this idea propose?
30. What is the name of the most recent supercontinent?
31. What were Wegener's lines of evidence for continental drift? How do each of these contribute to our understanding of continental drift?
32. By reconstructing Pangea, where on the globe does it place today's northern and southern landmasses? What evidence do we have that these were the appropriate locations for these landmasses?
33. Why were Wegener's ideas about Pangea and continental drift rejected? What did he incorrectly suggest?
34. Why was the idea of continental drift and Pangea revisited?
35. How is the direction of the Earth's magnetic poles recorded in rocks?
36. What is Curie point, and how does it help us to understand Earth's past magnetic field?
37. How do magnetized minerals provide a means of determining a rock's latitude of origin?
38. While studying the seafloor after World War II, what features were discovered on the seafloor?
39. How old is the oldest rock that makes up the ocean floor?
40. Who proposed the concept of seafloor spreading?
41. Describe what is involved for seafloor spreading. Where does new rock form on the seafloor? Where will this rock end up?
42. How do we know that the Earth's magnetic field occasionally reverses?
43. Is Earth's magnetic north at the same location as its geographic north pole (true north)?
44. Describe the polarity of rocks with the same magnetism as the present magnetic field (and vice versa).
45. When studying rocks of the same age, what did we notice about their polarity, which is strong evidence for magnetic reversals?
46. How are geomagnetic reversals recorded on the ocean floor?
47. Why is there a symmetric pattern of polarity on both sides of a mid-ocean ridge?
48. How does GPS data support the theory of Plate Tectonics?
49. When did Pangaea break apart?
50. Who proposed the theory of Plate Tectonics?
51. What is plate tectonics?
52. Which two ideas were united to form the theory of plate tectonics?
53. Why do the plates move?
54. How were the boundaries of the plates first established?
55. How fast do the plates move?
56. What are the three types of plate boundaries? What is the general motion at each one?
57. Where are the oldest rocks on the seafloor?
58. Which type of plate boundary is constructive? Destructive? Conservative? Why are these names also applied to these boundaries?
59. Where are most of the Earth's divergent boundaries? Why are these called spreading centers?
60. What is a mid-ocean ridge? What is a rift valley?
61. What type of plate boundary is a continental rift?
62. The East African rift valley is an example of which type of plate boundary? Why?

63. Why isn't the Earth growing larger?
64. What is the narrow, elongated depression on the seafloor where subduction occurs?
65. What is the process by which oceanic lithosphere sinks into the mantle at a trench?
66. What is a long, narrow zone where one lithospheric plate descends beneath another?
67. Why is it always oceanic lithosphere that is subducted?
68. What is released as the plate is subducted?
69. What does the addition of water do to the melting point of the rocks in the mantle wedge?
70. If the rising magma has to go through a continent, what happens to the composition of the magma?
71. What is the resulting volcanic mountain chain is called that is produced on the overlying continental plate?
72. When two oceanic slabs converge, which plate descends beneath the other?
73. What is the difference between a continental volcanic arc and an oceanic island arc?
74. Japan, Aleutian islands, and the Tonga islands are examples of what geologic feature?
75. What is produced by continental-continental convergence?
76. The Himalayas are an example of what type of plates converging?
77. The San Andreas Fault is an example of what type of plate boundary?

#### Week Nine: Volcanoes and Volcanic Hazards

78. In what ways are volcanoes classified?
79. What is viscosity and what affects it?
80. What does it mean for a magma or lava to be mafic? Felsic? Intermediate?
81. How does composition affect the viscosity of magma/lava? How does silica affect viscosity?
82. How does temperature affect the viscosity of magma/lava?
83. What does the eruptive style or explosiveness of a volcanic eruption depends on?
84. Why do gases expand within a magma as it nears the Earth's surface?
85. How is the violence of an eruption related to the viscosity of the magma?
86. If the magma has a low viscosity, what type of eruptive style will the volcano display? Why?
87. If the magma is very viscous, what type of eruptive style will the volcano display? Why?
88. Why did the 1980 eruption of Mt. St. Helens, WA occur as a lateral blast (out its side)?
89. Describe the viscosity, temperature, silica content, and eruptive style of Hawaiian volcanoes.
90. What are the two main types of volcanoes?
91. Why do shield volcanoes have gentle slopes?
92. Describe the temperature, silica content, viscosity, and eruptive style of shield volcanoes as well as stratovolcanoes.
93. What type of lava/magma has a high viscosity? Low viscosity? Intermediate viscosity?
94. What type of lava/magma has a high temperature? Low temperature? Intermediate temperature?
95. Which type of lava.magma has a high/medium/low silica content?
96. A gently-sloping shield volcano is formed.
97. Which type of magma/lava generally produces quiet eruptions? Violent eruptions?

98. Which type of volcano produces explosions that heap volcanic debris alternating with eruptions of lava around the vent?
99. Mt. Rainier, Mt. St. Helens, and Mt. Shasta are examples of which type of volcano?
100. What materials are erupted from volcanoes?
101. What gases are erupted from volcanoes?
102. Which type of lava/magma is felsic? Intermediate? Mafic?
103. What is pyroclastic material?
104. What is another name for pyroclastic material?
105. What are the size requirements for the different categories of tephra?
106. What is the difference between a block and a bomb?
107. In what ways can a volcanic eruption cause global cooling?
108. What caused the “Year without a summer” in 1816?
109. When is it appropriate to describe a volcano as active? Dormant? Extinct?
110. What geologic setting has produced the Cascade volcanoes of Northern California, Oregon, and Washington? What type of volcanoes are they, and what type of lava typically erupts from them?
111. What is a lava flow? What hazard do they cause?
112. Which type of basalt has a jagged, blocky surface?
113. Which type of basalt has a smooth or ropey surface?
114. What is an eruption column?
115. What is a pyroclastic flow and how does it form?
116. What volcanic hazard was responsible for deaths from Mt. St. Helens in WA, Vesuvius in Italy, and Mount Pelee, Island of Martinique in Caribbean?
117. What is a lahar what are some ways that one can form?
118. What is the main volcanic hazard we expect to occur from an eruption of Mount Rainier, WA?
119. Which type of lava erupts at a mid-ocean ridge?
120. Where is the greatest volume of volcanic rock being erupted?
121. Most volcanic activity occurs at what type of plate boundary?
122. How and where are pillow lavas formed?
123. What are the lines of volcanoes called that are produced from oceanic-oceanic convergence?
124. What are the lines of volcanoes called that are produced from oceanic-continental convergence?
125. Why does the mantle rock melt at convergent plate boundaries?
126. What is the “Ring of Fire” and where is it located?
127. What type of plate boundary is causing the volcanoes that make up the “Ring of Fire?”
128. What is intraplate volcanism, and what causes it?
129. Where do mantle plumes originate inside the Earth?
130. How do flood basalts form?
131. How do intraplate lines of volcanic islands form?
132. Why are most islands that are formed from a hot spot no longer active?
133. What is the geologic setting of both Hawaii and Yellowstone National Park?
134. How do hot spots help determine past plate movement?