1. What are the reasons why somebody might study geology and geophysics?
2. Why do we know more about continents than oceans?
3. Why do we know more about the crust?
4. Why was the original continental drift idea not accepted?
5. What things got people thinking about continental drift in the first place?
6. What are the processes involved in making new lithosphere vs. getting rid of it?
7. How do we know what the layers of the Earth are?
8. What is the s-wave shadow, and why is it significant with regard to understanding the deep Earth?
9. What are the layers of the Earth with respect to composition?
10. What compositions (rock/mineral name) make up these layers?
11. What are the layers of the Earth with respect to physical properties (solid, liquid, etc.)?
12. What are some of the ways we know what these layers are?
13. Prior to the understanding of plate tectonics, what are some of the things that folks had a hard time explaining (or explaining without contradicting the explanations of other things)?
14. What are the different types of plate, and what are their characteristics?
15. What are the different types of plate boundaries, and what are their characteristics with respect to volcanism and seismicity?
16. Why are the different types of plate boundaries different?
17. What is the geological definition of a mineral?
18. What is the geological definition of a solid?
19. What is glass?
20. What are the 8 most common minerals on Earth?
21. Which of these are common in Hawai‘i, and what are their main characteristics?
22. Be able to identify (in a real rock) the 4 common minerals that occur in Hawai‘i.
23. What are the 3 main types of rocks, and how do they form?
24. What is melting?
25. What does partial melting mean?
26. What is the relationship between partial melting, the composition of the melt w/respect to the source rock, and the volume of melt produced (the red vs. blue gelatin).
27. What minerals make up the source rock that melts to form Hawaiian magmas, and why do we care about them with respect to the resulting magma composition?
28. What is the relationship between % of melting and alkalic vs. tholeiite basalt?
29. What are the 3 ways that melting (to form magma) occurs within the Earth?
30. Where do these styles of melting occur?
31. What is one reason that magmas at subduction zones are explosive?
32. How does crystallization rate affect crystal size in igneous rocks?
33. What igneous textures result from fast, slow, and slow-then-fast cooling of molten rock?
34. What is the difference between gabbro and basalt?
35. What is the difference between rhyolite and granite?
36. How are obsidian and pumice similar? How are they different? What did people use them for in the past, and what do they use them for nowadays?
37. What are the two main types of basalt that are found in Hawai‘i (and the world, actually), and what do they tell you about the degree of partial melting that formed them?
38. Where is Lō‘ihi? (be able to draw it in on a map)
39. How was the name Lō‘ihi derived? Are there other names for Lō‘ihi?
40. What evidence is there that Lō‘ihi is the youngest Hawaiian volcano?
41. What is the evidence that Lō‘ihi is active?
42. What is a seamount?
43. Why are there young volcanoes at one end of the Hawaiian volcano chain, and old volcanoes at the other end?
44. Why is there a bend in the Hawaiian volcano chain?
45. What is the probable structure of the Hawaiian “hotspot”, and how does this relate to the amount of partial melting?
46. How is the general internal layering of a Hawaiian volcano related to the structure of the hotspot?
47. How does passing over the hotspot result in a Hawaiian volcano that has different compositions in its bottom, middle, and top?
48. What are the surface characteristics of a rift zone, and how would you identify one on a young volcano?
49. What is a pit crater, and how do they form?
50. What are the subsurface characteristics of a rift zone, and how would you identify one on an old volcano?
51. What is a dike, and why do they have knife-like shapes?
52. How do we determine dike dimensions?
53. What is the relationship between seismicity and dike propagation?
54. Why do dikes tend to propagate down the middle of rift zones?
55. What is the effect of rift zones on the shape of a volcano?
56. How do rift zones on adjacent volcanoes tend to orient themselves?
57. What are the 3 main types of seismic waves we can see on seismograms?
58. Which seismic wave is recorded first? Which one is recorded second? Which one is recorded third?
59. What is the effect of rift zones on the shape of a volcano?
60. What is a caldera, and how is it related to activity within a magma chamber?
61. What is a magma chamber? How deep do they tend to be during the active, tholeiite stage of a Hawaiian volcano’s life?
62. How are earthquakes associated with propagating dikes?
63. What is the difference between an earthquake’s focus and epicenter?
64. What is the difference between stress and strain? What are different types of strain?
65. Why does the south flank of Kīlauea move seaward (sometimes slowly, sometimes fast, as during an earthquake)?
66. Why are there big faults on the south flank of Kīlauea? Did they form all at one time or episodically?
67. Why are the Nīnole hills enigmatic? How might they have formed?
68. How are earthquakes located?
69. How are earthquake sizes determined?
70. What are the main causes of earthquakes in Hawai‘i, and where do they occur?
71. What is the Hilina fault system?
72. What are some of the bad effects of earthquakes?
73. How is earthquake damage related to construction practices?
74. Why was Halapē such a bad place to be during the 1975 Kalapana earthquake?
75. How do characteristics of a coastline (shape, presence or lack of reefs, etc.) effect tsunami damage?
76. Why are tsunami so difficult to detect in the open ocean?
77. Why do lots of folks call tsunami “tidal waves”?
78. How fast do tsunami travel?
79. Why are tsunami so difficult to detect in the open ocean?
80. Why are tsunami so destructive and dangerous?
81. What are the two types of basalt lava flows common in Hawai‘i?
82. What are the different surface and interior properties of ‘a‘ā and pāhoehoe?
83. What is the relationship between ‘a‘ā and pāhoehoe with respect to flow-front velocity, eruption rate, and lava channel vs. lava tube?
84. What is meant by lava “inflation”?
85. How do lava trees form?
86. What is a tumulus (plural = tumuli)?
87. Why is the pāhoehoe-to-‘a‘ā transition a one-way transition?
88. What are vesicles?
89. How do the presence or absence of vesicles affect how a stone will break when it is being shaped into an implement?
90. How do we know details about events that happened in Hawai‘i prior to written records?
91. How can you determine the temperature of stream water without a thermometer? Why would anybody care?
92. How does the orientation of a steep-walled valley affect the crops that can or can’t be grown there?
93. Why was the south coast of Moloka‘i such a good place to build fishponds back in olden days?
94. What is the point of building fish ponds in the first place? How do they work?
95. What geologic evidence is there that there have been glaciers on Mauna Kea in the past?
96. What is the connection between glaciation and sea level?
97. What is the evidence that there were eruptions of Mauna Kea during the times that there were glaciers up on the summit?
98. What is the cultural significance of these syn-glacial eruptions?
99. What is the controversy associated with Mauna Kea’s summit, and why is it so difficult to resolve?
100. What conditions are required for glaciers to develop?
101. What is a moraine, and what is its connection to the size of a glacier?
102. What are isotopes?
103. What is a proxy?
104. On older Hawaiian volcanoes, what is the connection between the lower magma supply and the volcano’s profile?

105. What is the connection between a lack of a shallow magma chamber and the vigor of eruptions?

106. What is the connection between lava flow temperature and a volcano’s profile?

107. If you were shown the profiles of Mauna Loa and Mauna Kea, would you be able to tell them apart? How?