

Knowledge Survey

Geology 100 Survey of Geology (Geology and Human Affairs)

This is a knowledge survey rather than a test. The purpose of this survey is to serve as a study guide and to help you and the instructor evaluate the change produced in your knowledge by this course. In this knowledge survey, you won't actually try to answer any of the questions provided. Instead, you will rate (on a three-point scale) your confidence to answer the items based on your present knowledge. Read each question and then respond by clicking the appropriate response button on Web in accord with the following rating.

SURVEY INSTRUCTIONS

Mark an "A" as response ONLY if you feel confident that you can now answer the question sufficiently for graded test purposes. Mark a "B" response to the question if you can now answer at least 50% of it or if you know precisely where you could quickly get the information needed and could return here in 20 minutes or less to provide a complete answer for graded test purposes. Mark a "C" as response to the question if you are not confident that you could adequately answer the question for graded test purposes at this time. These marking of an "A" "B" or "C" will go quickly after you get the hang of responding based on confidence.

Accurate self-assessment is a practical skill that is more important than even current content knowledge. It is important to make an accurate self-assessment so that you can obtain the best learning enhancement from a knowledge survey. What constitutes a successful response to this survey is an accurate self-assessment, one that neither overestimates nor underestimates the knowledge that you now currently have. Do your best to provide a very honest assessment of your present knowledge. If you mark an "A" or a "B" that states you have significant background to answer a question, you should be confident that if your professor asks you to demonstrate that ability by actually answering the so-designated questions, that you could actually respond for graded test purposes.

This survey will be given again at the end of the semester. Save/print the survey and refer to the items as we progress through the course in order to monitor your increasing mastery of the material as we proceed through the semester.

GOAL 5 Learning Outcomes

1. Describe the basic methods of science (method of repeated experimentation and method of historical science) and provide one example each of its application.
2. Pick a single theory from the science represented by this course and explain its historical development.
3. With respect to the scientific method what happens to hypotheses that aren't proven correct? **A.** they become theories **B.** they are discarded **C.** they recycled into other projects **D.** they are tested through theories **E.** they are guessed at in an educated fashion.

4. Provide two examples of testable hypotheses.
5. Provide two specific examples that illustrate why it is important to the everyday life of an educated person to be able to understand science.
6. Describe two current examples of the relationship between physical science and public policy.
7. Describe an example of how the Earth's internal heat drives physical processes we can observe at the Earth's surface.
8. Describe an example of how solar energy drives physical processes we can observe at the Earth's surface.
9. Describe the relationship between geologic processes and natural resources used by human society.
10. Outline our understanding of geologic time and discuss the concept of "four-dimensional science."

Chapter 1 Geology and Human Affairs

11. What is geology?
12. The cost of natural disasters in the U. S. is now about: **A.** 100-thousand dollars a week **B.** a million dollars a week **C.** a billion dollars a week **D.** ten billion dollars a week **E.** twenty billion dollars a week.
13. The population of the world doubles about every **A.** 3800 years **B.** 380 years **C.** 38 years **D.** 3.8 years **E.** 38 months.
14. The costliest natural disasters are **A.** Earthquakes **B.** Hurricanes **C.** Floods **D.** Expansive soils **E.** Landslides.
15. Consider a small motor scooter that has low emissions and gets about 100 mpg (or you can consider your own car if that is more to your taste). Name ten materials that must be extracted through mining in order to make the vehicle.

Chapter 2 Materials Processes, Change-through-Time

16. What is meant by "uniformitarianism?"
17. Contrast the validity of "catastrophism" and "gradualism."
18. Numerical dating of rocks is based mostly on... **A.** radioactive decay of unstable isotopes **B.** superposition of sediment layers **C.** weathering of igneous rocks **D.** interpretation rock relationships **E.** guesswork
19. Relative dating principles tell us that... **A.** the oldest rock in the world is 4.6 billion years old **B.** radioactive decay is based on the half life of an isotope **C.** the Earth is older than the moon **D.** in a sequence of sedimentary rocks, the layer on the bottom is the oldest
20. The name of the anion expressed as CO_3^{-2} is _____
21. The name of the anion expressed as SiO_4^{-4} _____
22. An atom has 19 protons, and 20 neutrons. How many electrons does it have? Calculate the atomic number and weight of the atom. Consult the periodic table and identify the element.

23. Which bond type is weakest? **A.** ionic **B.** covalent **C.** metallic **D.** tetrahedral **E.** super glue
24. Name in order of abundance the five most abundant elements in the solid earth crust.
25. Name in decreasing order of abundance the most common minerals in sedimentary rock.
26. How do chemical sedimentary rocks differ from clastic sedimentary rocks? **A.** chemical sedimentary rocks are made of chemical elements, while clastic are not **B.** clastic sedimentary rocks are held together by covalent bonds, while chemical sedimentary rocks are held together by ionic bonds **C.** components of clastic sedimentary rocks are transported as visible pieces, while those of chemical sedimentary rocks are not **D.** clastic sedimentary rocks are composed of materials derived from preexisting rocks while chemical rocks are not.
27. Explain with specific examples how one can distinguish between igneous, sedimentary and metamorphic rocks.
28. Identify five common rocks found in the Pocatello area.
29. Why are some metamorphic rocks weak relative to igneous rocks? **A.** some metamorphic rocks are rich in mica, which has weak bonds **B.** they weather more deeply than igneous rocks **C.** igneous rocks have more ionic bonds than do metamorphic rocks **D.** metamorphic rocks consist of salt, which dissolves easily **E.** because Fred Vine said so.
30. Gabbro is generally coarser grained than andesite. This is because coarser grained igneous rocks are: **A.** more prone to weathering **B.** generally less silica rich **C.** formed from a magma/lava that cools quickly **D.** are formed from magma that cooled slowly within the Earth's crust **E.** subjected to great amounts of heat and pressure, and thus are more silica rich
31. What is asbestos?
32. Two controversies surround the asbestos hazard: (1) it's nothing more than a very expensive bureaucratic creation, or (2) it is a hazard that accounts for tens of thousands of deaths annually. What is the basis for each argument?
33. Which side of the two controversies expressed above has the best current scientific support?
34. Contrast the time of known existence of humans with the age of our planet.
35. Name in order from oldest to youngest the established time periods and eras of the geologic time scale.
36. What is the most commonly used indicator to determine the specific geologic time period in which a sedimentary rock was deposited?
37. What is radioactivity?

Chapter 3 Plate Tectonics

38. Tectonic plates typically move about as fast as **A. freight trains (Union Pacific)** **B. swallows (European, not African)** **C. sea turtles** **D. finger nail growth** **E. a Detroit Tigers baseball game for a Tigers fan**
39. Why was it necessary to understand the principles of original horizontality, superposition and crosscutting relationships before we could begin to compose the theory of plate tectonics?
40. What happens when one continent is forced under another? **A. volcanism** **B. mountain building** **C. divergence** **D. hot spot initiation** **E. holy war**
41. Where is there an active continent-continent convergent boundary? **A. Himalaya** **B. Appalachians** **C. Andes** **D. Japan** **E. East Africa**
42. Where is there an active divergent plate boundary? **A. Himalaya** **B. Appalachians** **C. Andes** **D. Japan** **E. East Africa**
43. What type of plate boundary dominates southern and western California? **A. divergent** **B. continent-continent convergent** **C. transform** **D. subduction zone** **E. I'm not sure, but it was probably decided through voter petitions**
44. Earthquake waves are generated when **A. plastic deformation bends rocks** **B. elastic deformation is released suddenly** **C. rocks break during brittle deformation** **D. Pluto, god of the underworld, decides California should drop into the ocean** **E. bombs are dropped on active fault zones**
45. I was a warrior--twice wounded in battle and a global adventurer and explorer. I set aeronautical records in balloon travel. Jacques Cousteau and Columbus had nothing on me. I traveled more and saw more than any score of scientists usually see in their lifetimes. Although I was a meteorologist, I was fascinated by that jigsaw appearance of the continents--how they seemed to fit together. I assembled massive evidence from geophysics, physical geology, paleontology and paleoclimatology to show how and when movement of continents had occurred. My theory was not taken seriously in my lifetime, especially not in America and England. It was tremendously painful to KNOW yet not be heard or believed! I eventually died in exploration--during a blizzard in Greenland on my 50th birthday--I could not have chosen to live life any less fully." This quote could best describe the life events of **A. Samurai Jack** **B. Stephen Jay Gould** **C. Harry Hess** **D. Alfred Wegener** **E. J. Tuzo Wilson.**
46. "I took an overwhelming amount of data on topography, geology, and earthquakes and began to produce an expanded theory to include a combination of rigid plates and mobile belts. I recognized that the ocean basins have opened and closed several times and that the process can be described as an evolutionary sequence. The adventurer and explorer who proposed drifting of continents was right. A huge serving of crow is being placed before those who laughed at him." This quote could best describe the life events of **A. Douglas McArthur** **B. Stephen Jay Gould** **C. Harry Hess** **D. Alfred Wegener** **E. J. Tuzo Wilson.**

Chapter 4 Earthquakes and Tsunamis

47. What is an "epicenter" of an earthquake?
48. What is the "focus" of an earthquake?
49. What two major areas of the world are known for extremely advanced knowledge in planning and designing against earthquake hazards?
50. What are "aftershocks?" How long after an earthquake might they pose a danger?
51. How do geologists specify whether a fault is active or inactive?
52. Why are kitchens particularly hazardous areas during earthquakes?
53. The Richter scale was not devised until 1934, yet tables in books give magnitudes of earthquakes as early as 1755. How can this be?
54. Why are land use planning and building codes the most effective defense against earthquake damage? **A.** because we can tell where earthquakes are likely to occur and how big and frequent they are likely to be **B.** because we are getting better and better at telling exactly when an earthquake might strike **C.** because earthquakes could strike anywhere, at any time **D.** because people just *love* being told what they can and cannot do with their property **E.** because earthquakes always give some signal that they are about to happen.
55. In the winter of 2003, a structural engineer's report indicated that Washington School, located several blocks north of the ISU campus, would not be strong enough to withstand major shaking in an earthquake. It was thus suggested that Washington School might be closed. Imagine that you are a concerned parent of a Washington School student. You don't want the building to collapse on your child, but you love the notion of a neighborhood school and want it to remain open if possible, without endangering the students and teachers. So, you decide to look into the question of earthquake shaking. *Describe the information you would need to know to determine the potential level of earthquake shaking at Washington School. Discuss why you need each type of information and how you might go about gathering that information.*
56. Why are tsunamis a more frequent threat to the Pacific Coast of North and South America than to the Atlantic Coasts?
57. Where are you best off when a tsunami arrives? **A.** on your boat in the harbor, so you don't get blasted by the waves **B.** on your boat at sea, where the waves are lower **C.** on the beach, so you can see the wave coming **D.** in your beachfront house, which a tsunami would never knock down **E.** running like h___ from the beach, toward Lincoln, Nebraska **F.** heading anywhere but Lincoln, Nebraska, giving thanks you live in a more exciting place than that.
58. What causes most tsunamis?
59. What design was used to "wave-proof" a hotel constructed at Hilo?
60. Why don't all large earthquakes cause tsunamis?
61. How frequently do tsunamis 10-15' high occur?
62. Do mega-tsunamis ever strike the western U.S? What evidence do we have?
63. What country suffers the most casualties from tsunamis?
64. What Japanese island was affected in 1993, and what factors complicated the disaster?

Chapter 5 Volcanoes

65. What damage is caused by volcanic ash?
66. Name three gasses emitted by volcanoes. Which one is most abundant?
67. What criteria are used to predict volcanic eruptions?
68. Why do people live near volcanoes?
69. What is meant by the term, "pyroclastic?"
70. Contrast "caldera" with "lava dome."
71. What are the most serious hazards caused by volcanoes?
72. What is the value of geologic mapping and dating of volcanic deposits in dealing with the actual hazards?
73. How does one obtain information about the volcanic hazards present in a given area?
74. What causes volcanoes to explode?
75. Why does silicon content in a magma or lava control the eruptive style (explosivity) of a volcano? **A.** silicon content affects viscosity, which affects the ability of gas bubbles to cause increased pressure **B.** silicon content affects the types of gases that form, some of which are more flammable than others and more likely to explode **C.** silicon content affects viscosity, which affects the ability of a lava to flow further and not pile up into an unstable volcanic structure **D.** silicon content affects the mood of Vulcan (god of fire), and if there's too much of it he gets ornery
76. Why have lahars been such a major hazard in the years following the 1991 Pinatubo eruption? **A.** there is still hot ash falling on the extensive snowfields on the volcano **B.** abundant rain falls on the large volumes of loose ash on the mountainside, turning it to mud **C.** the volcano continues to have large eruptive episodes **D.** pyroclastic flows run into lakes and turn to mud **E.** I don't know, but it must have *something* to do with American infidels and their imperialistic tendencies
77. What type of volcanism has occurred most frequently (on geologic time scales) on the Snake River Plain over the past 20,000 years? **A.** rhyolite **B.** andesite **C.** basalt **D.** komatiite **E.** volcanism never occurs on the Snake River Plain.
78. The ejection into the upper atmosphere of large quantities of volcanic ash and other volcanic ejecta (including aerosols—fine liquid droplets) occasionally causes temporary, but substantial climatic cooling. What type of volcano would be most likely to have such an effect? **A.** basalt **B.** andesite **C.** rhyolite **D.** granite **E.** limestone **F.** hair spray
79. You are on vacation at Mt. Rainier, a composite volcano in the Washington Cascades. You and your companions begin to hear rumbling and see a small amount of ash rise from the crater. Your companions are not concerned and don't want to leave the area. Two of them said they were in Hawaii last year when the volcano Kilauea erupted, and it was really neat and barely dangerous. They point out that a little lava never hurt anyone and that since you are 2 miles from and 4,000 feet below the summit, you are out of the hazard zone. a) Discuss whether or not you agree with your companions. b) Discuss why or why not. Describe in detail how volcanoes operate, and discuss the potential hazards.
80. Two NOVA videos you have seen, one on Mt. Pinatubo and one on earthquake prediction, paint two different portraits of natural hazard prediction. At Mt. Pinatubo, the US Geological Survey volcanologists issued a successful short-term

prediction of the major eruption. As for earthquakes, attempts at short-term prediction have been far less successful. a) For predicting volcanic eruptions and earthquakes, describe at least two types of information that are used for each type of prediction and what the information tells them. b) Discuss why prediction of earthquakes is so much less successful than prediction of volcanic eruptions, and the strategies that have been used to overcome this lack of success.

Chapter 6 Soils Weathering and Erosion

81. Distinguish between: weathering, mass wasting, erosion, transportation, deposition, and lithification.
82. Give two examples each for mechanical and physical weathering.
83. How can we distinguish between residual and transported soil?
84. What determines the distribution of pedocal and pedalfers soils?
85. Explain the role of water as an agent of chemical weathering, physical weathering, transportation, and selective deposition.
86. List in order of importance the primary factors that determine the rate of gully erosion of soil.

Chapter 7 Mass Wasting and Subsidence

87. Name the energy(ies) that ultimately produce(s) the movements of mass wasting?
88. Which of the following can contribute to landslide problems? **A.** Sedimentary layers parallel to a slope **B.** Foliation in metamorphic rocks **C.** Alternation of clay and sand beds **D.** All of the above. **E.** None of the above. All of these situations sound peachy to me!
89. What is meant by "factor of safety?"
90. Do humans cause landslides? If so, how?
91. What is the role of water in mass wasting?
92. Name three kinds of mass wasting that are important in the Pocatello area
93. What are the annual damages in dollars caused by subsidence? How much of this is caused by karst sinkholes?
94. If you are a prospective homeowner, what precautions would you take to protect yourself against losses from subsidence?
95. What is "permafrost?"
96. How can you tell hydrocompaction damage from swelling soil damage in an existing neighborhood?
97. **T or F:** Sinkholes are associated with karst topography
98. **T or F:** The locations of old mines are all well-known
99. **T or F:** The federal government will pay for repair of your home if it sinks into a coal mine
100. Why are limestones sometimes associated with subsidence?

Chapter 8 Fresh Water Resources

101. How does groundwater mining occur? **A.** recharge occurs faster than pumping can keep up with it **B.** water is pumped from a spring, which is a groundwater discharge area **C.** water is lost from the aquifer by evaporation **D.**

- more water is pumped from the aquifer than enters by recharge **E.** in deep shafts, with drills, dynamite, and very clean miners.
102. Explain how increasing each of the following affects groundwater rate of flow: aquifer porosity, aquifer permeability, hydraulic head.
103. Classify the following as generally **A**, aquifers or **B**, aquicludes: sandstone, shale, limestone, basalt.
104. Explain how a cone of depression forms around a well.
105. What are some common ways to contaminate one's own domestic well?
106. Explain by diagram: confined aquifer, unconfined aquifer, and perched water table.
107. What governs the locations of most springs?
108. What is one reason for the big legal conflict over water on the Snake River Plain? **A.** There is not enough water in dry years to satisfy all of the water rights **B.** The increase in groundwater pumping has increased surface water flows **C.** Groundwater users were the first users, so their water rights have priority **D.** Everybody loves lawyers and wants them to prosper.
109. The water table in the Lower Portneuf aquifer at Pocatello has dropped rather dramatically in the past few years. Why? **A.** more water is being pumped from the aquifer than is entering from precipitation **B.** excess snowmelt has entered the aquifer in the Mink Creek area **C.** contamination has entered the aquifer from the landfill area **D.** the Portneuf River is losing water to the aquifer **E.** Gophers— it's gotta be the gophers.
110. Explain how the unique characteristics of Earth permit a "water cycle" whereas this cycle may not exist on other planets.

Chapter 9 Surface Water Hazards and Floods

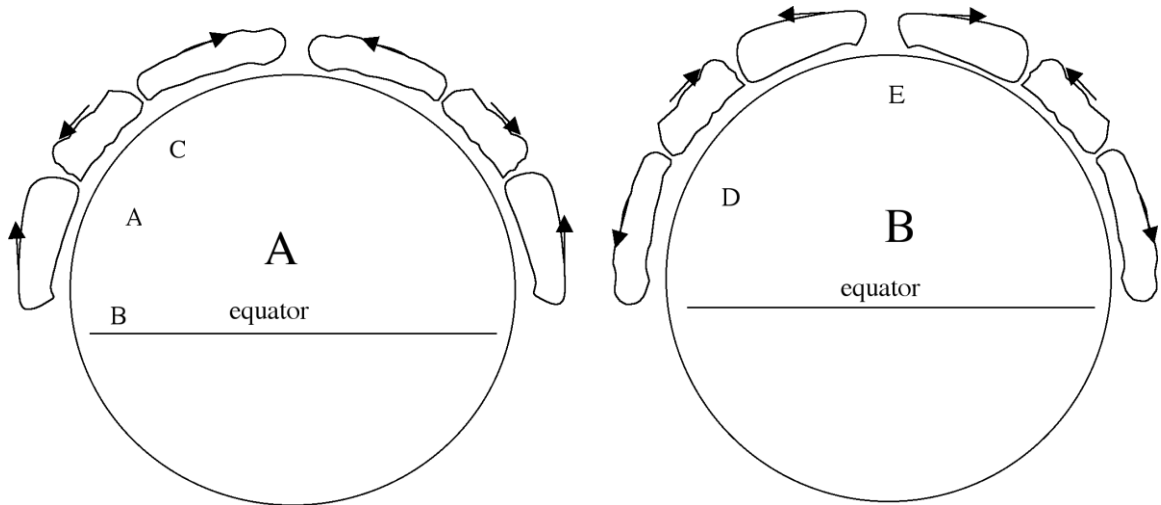
111. Explain what is meant by the "100-year flood" and the "base flood elevation?"
112. Despite massive investments in locks, dams and levees, the U.S. losses from major floods have increased in dollar losses exponentially since major government flood control programs were initiated. Why?
113. Distinguish in both magnitude and change through time, the difference between flash floods along a small tributary and riverine floods along a major stream.
114. In the 1960's, dam opponents successfully fought proposals for two new dams. Where were those dams? **A.** Glen Canyon **B.** Grand Canyon **C.** Hells Canyon **D.** Black Canyon **E.** Pocatello Canyon
115. What was the principal cause of the 1997 flood on the upper Snake River? **A.** record snowpack and late spring rains **B.** urban development **C.** agricultural runoff **D.** mismanagement of flood control dams **E.** diversion of water for irrigation .

Chapter 10 Coastal Ocean Environment

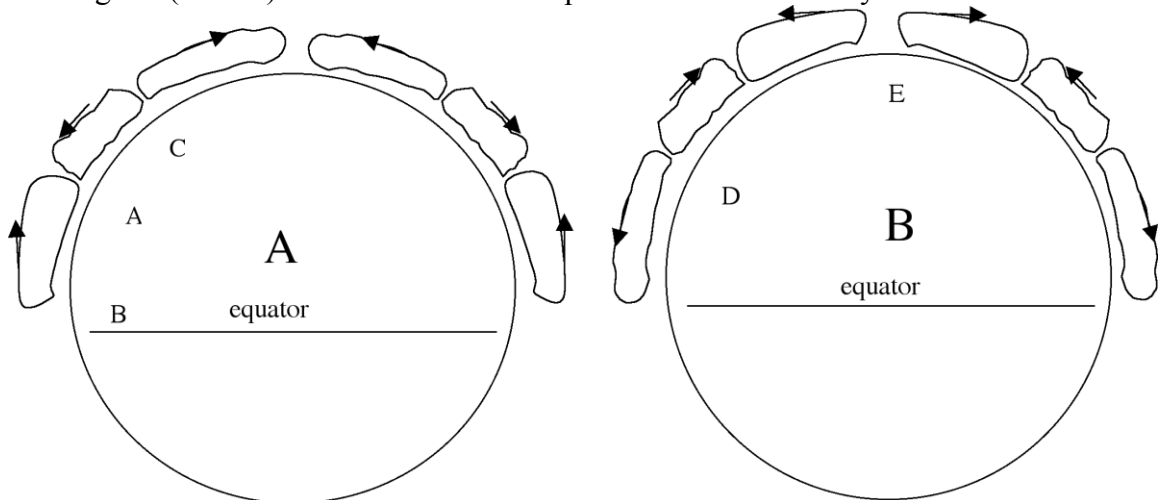
116. Why are some beaches sandy in summer and rocky in winter?
117. What causes longshore currents?
118. Sketch a breakwater and show the configuration of the shore after its effects are developed.
119. What is a barrier island, and what are its attributes in terms of materials, processes and change-through-time?
120. At what water depth do normal waves cease to move much sand toward the beach zone?
121. Explain by diagram: stack, tombolo, wave-cut bench.
122. What is the primary cause of beach erosion?
123. What is a "wetland?" Give three properties that give wetlands importance.
124. In a coastal storm, what kind of vegetation (native or introduced) would likely better preserve a coast and survive a major storm?
125. Contrast the mechanisms that cause tsunamis and storm surges.
126. Which are more destructive—tsunamis or storm surge?
127. **T or F** When water levels rise, coastal erosion decreases.
128. **T or F** Construction will produce no changes to a beach other than at the site actually developed..
129. Consider three situations (a) zoning beach areas out of development; (b) designing a properly constructed beach home and (c) procuring insurance for a coastal home. Give an example in which each of the above would be the most socially responsible action.
130. Evaluate the statement: "Engineered structures designed to protect a coastal environment may end up destroying or devaluing that same environment."
131. Evaluate the statement as it pertains to shorelines: "Design and building in accord with natural processes is by far cheaper than overwhelming a perceived problem with technology."

Chapter 11 Glaciation & Climate Change

132. How do glaciers move, and how is this movement related to the changes that occur in the crystals of ice with depth in the glacier?
133. How do glaciers cut grooves in solid rock?
134. Basically, what causes "ice ages?"
135. How much of the known land surface was covered with ice during the ice ages; how long ago was the most recent coverage, and what percent of North America was beneath ice?
136. Are the deserts presently expanding or shrinking? Give specific evidence for your answer.



137. Refer to the two diagrams above, which, despite the crummy artwork, represent atmospheric circulation patterns in the northern hemisphere. Which diagram (A or B) shows the circulation patterns most accurately? **A. B.**



138. Refer to the two diagrams above. Which small letter marks the place where a desert is most likely to exist? **A. B. C. D. E.**
139. The ejection into the upper atmosphere of large quantities of volcanic ash and other volcanic ejecta (including aerosols—fine liquid droplets) occasionally causes temporary, but substantial climatic cooling. What type of volcano would be most likely to have such an effect? **A. basalt B. andesite C. rhyolite D. granite E. limestone F. hair spray**
140. Why might “global warming” be of concern to an agency, such as the U.S. Bureau of Reclamation, that manages water supplies in Idaho and other western states? **A. the water will be warmer, and, thus, less useful for irrigation B. if temperatures rise in the region, a greater proportion of precipitation may fall as rain rather than snow, making water management more difficult C. sea level rise could cause considerable changes in groundwater flow D. the North Atlantic conveyor belt could shut down, causing even greater warming in the western U.S.**
141. What is the best evidence that variations in the Earth's orbit control the glacial cycles? **A. The cycles recorded in the marine oxygen isotope record (in**

- shells of small marine critters) match the cycles of changes in the Earth's orbit over the last two million years **B**. The Antarctic carbon dioxide record matches the temperature record. **C**. The pollen record from lakes at throughout North America shows warming over the last 12,000 years. **D**. I read it in the National Enquirer, so it must be true. **E**. All of the above, except it was really in the Weekly World News
142. At its most basic, the Greenhouse Effect is: **A**. emission of carbon dioxide from fossil fuels **B**. trapping of heat by atmospheric gases **C**. changes in the Earth's orbit **D**. particularly intense solar radiation **E**. political hot air.
143. There is much evidence to support the theory of the Greenhouse Effect, and some of it suggests that the climate is already warming because of rising carbon dioxide levels. Yet it remains difficult to reduce global carbon dioxide emissions. **Discuss** at least three reasons for this difficulty in doing anything to reduce human impact on climate.
144. What is the principal characteristic of an El Niño "event"? **A**. trade winds blow strongly to the west across the Pacific Ocean **B**. Idaho is extremely wet **C**. warm water moves from the western Pacific to the eastern Pacific **D**. Indonesia and northern Australia are very rainy **E**. climate forecasts are particularly inaccurate.
145. How does the atmosphere function to protect life on earth?
146. Why can we refer to wind as a "heat-driven engine?"
147. The trade winds form around what part of the earth?

Chapter 12 Arid Lands & Desertification

148. What qualifies an area as a "desert?"
149. Explain three conditions that can produce deserts on our planet and give a geographic example of each.
150. What is the most common type of weathering in deserts?
151. What is the most common agent of erosion in deserts?
152. What is an arroyo?
153. Are there any alluvial fans near Pocatello?
154. Is there any loess in Pocatello?
155. Where are the bulk of loess deposits in the U. S. today?

Chapter 13 Mineral Resources and Society

156. What do we call a metallic mineral deposit that can be mined at a profit?
A. Gold! **B**. a mineral resource **C**. a vein **D**. ore **E**. an industrial mineral
157. Name two plants (common names are o.k.) that are effective in removing heavy metals from water.
158. What three major Earth materials must combine to produce acid drainage?
159. In what type of sedimentary rocks would we be likely to find pyrite?
160. Iron ore comes primarily from **A**. seawater **B**. magmatic concentration **C**. hydrothermal concentration **D**. evaporation **E**. residual weathering accumulations

161. Copper ore in Cyprus and the Andes comes primarily from **A.** seawater **B.** magmatic concentration **C.** hydrothermal concentration **D.** evaporation **E.** residual weathering accumulations
162. Gypsum for wall board primarily from **A.** seawater **B.** magmatic concentration **C.** hydrothermal concentration **D.** evaporation **E.** residual weathering accumulations
163. Hydrothermal mineral deposits would be *least* expected to form in what type of plate tectonic setting? **A.** transform boundary **B.** oceanic divergent boundary **C.** oceanic subduction zone **D.** continental subduction zone.

Chapter 14 Energy Resources

164. What is the ultimate source of energy in oil and natural gas? **A.** solar energy, stored by plants in their tissues **B.** energy from the mantle, pumped into the crust **C.** radioactive energy **D.** volcanic energy **E.** Power Bar energy
165. What is the ultimate source of energy in a Power Bar? **A.** solar energy, stored by plants in their tissues **B.** energy from the mantle, pumped into the crust **C.** radioactive energy **D.** volcanic energy **E.** electrical energy
166. If current trends continue, why will most available oil by 2020 be in the Middle East? **A.** There isn't much oil anywhere else **B.** Very little oil is now extracted from the Middle East oilfields **C.** The majority of oil being used now is from non-Middle East sources **D.** The Middle East is one of the few places where oil is being cooked at the right temperatures, and their supplies are rapidly increasing **E.** Middle East societies are very conservation minded and are preserving their meager supplies
167. Contrast the advantages and disadvantages of replacing electrical generation by coal with electrical generation by nuclear power.
168. Hydrogen fuel cells and high efficiency batteries make electrical automobiles practical. What are two advantages and disadvantages of replacing gas-powered automobiles with electric automobiles?
169. How does radon enter a building?
170. The following are common rock and soil materials. Label in the Radon column as "H" for producing high amounts of radon gas or "L" for producing low amounts of radon gas

| Rock/soil type | Radon |
|-----------------------------------|-------|
| glacial till derived from granite | |
| limestone | |
| granite | |
| black shale | |
| basalt | |

171. Is it possible for a rock low in uranium to yield a soil that will be a fairly rich source of radon gas?
172. An argument can be made that the "radon hazard" is merely an overblown issue created by bureaucrats. What is the basis for this argument.?

173. An argument can be made that radon is a health hazard. What is the basis for this argument?

Chapter 15 Waste Management & Geology

174. About how much municipal solid waste is generated per person per day?
175. Is municipal waste an accurate measure of the impact of a modern society on the Earth?
176. Explain "eutrophication."
177. How have landfills changed in design in recent decades?
178. Explain how using the ocean as a disposal area may be a means for distributing pollutants rather than eliminating them.
179. Mercury in tuna fish is a major news issue today. Where did the mercury come from that's now in the cans of StarKist®?