

The Evolutionary Earth

Sample Test GenSci 102 Test # 2 Environment: Earth

Name: _____

Date: _____

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*Write Your People Soft (Not Social Security) Number
on the Scantron Card*

**DO NOT OPEN THE TEST
UNTIL EVERY ONE IS SETTLED AND READY TO START**

This is a **CLOSED NOTE/CLOSED BOOK TEST**. You may have nothing with you while taking it except writing materials.

INSTRUCTIONS FOR TESTS

- ☞ Note that your test score is not your test grade. Check with the posted curve to convert your test score into a grade.
- ☞ Timing: you have exactly the class time to take the test, no more.
- ☞ The questions are a mixture of True/False or Multiple Choice.
- ☞ Drawing, diagrams, figures required for certain questions are often at the back of the test. You may pull that sheet off to make it easier to answer questions.
- ☞ Different questions may have different values, as indicated with each set of questions.
- ☞ Multiple choice questions may have 3, 4, 5, or as many as 20 choices. When there are more than 5 choices they are distributed among more than one question number, as below. These questions are always placed in a box to indicate that they belong together to answer one question, as in the example below.
- ☞ Unlike other Scantron tests given on campus, many or most questions on these tests must be left blank to have a correct answer. Often on other tests a blank row means a wrong answer. That is not true here. For example, the 15 choices below require only one answer, so at least two rows must be left blank.
- ☞ Some multiple choice questions may have more than one answer scattered among the 15 to 20 choices available. This means that some rows may have more than one answer chosen, while another row may have no answers chosen. This is normal on these tests.

Feature A on the cross section is identified by which **ONE** of the terms; leave the other 14 blank.

1.	1A,	1B,	1C,	1D,	1E
2.	2A,	2B,	2C,	2D,	2E
3.	3A,	3B,	3C,	3D,	3E

- ☞ Wrong spellings are not part of the test. I do not deliberately make minor , or try to be confusing or ambiguous. If something seems strange assume it is an honest mistake and answer the question as best you can.
- ☞ However, questions may be subtle and complex, read them carefully.

Note that your grade for the test will be based on a curve drawn over the distribution of raw scores. I draw the curve by hand, but have no need to have a specific percentage of A's, B's, C's etc. In fact, I would like everyone to do well, but will draw the most fair curve I can based on how everyone in the class does. I ignore the computer generated percentages.

Your total score will be sent to you via e-mail. The total score is not your grade, but I will e-mail the curve ranges to you so you have an idea how you did.

**Multiple Choice questions are worth 3 points,
Except where noted otherwise; All True/False are worth 2 point.**

Questions are more or less in the order of class presentation

PP12 - Earth's First Billion Years

MULTIPLE CHOICE:

Earth environments at 4.0-3.9 billion years ago was characterized by which of the following: (True=Yes; False=No. None, one, more than one may be true)

1. T/F. Oxygen escaping from volcanoes into the atmosphere.
2. T/F. A sulfuric rich atmosphere.
3. T/F. Lots of carbon dioxide in the atmosphere.
4. T/F. Huge tidal currents that swept around the world at least twice a day.
5. T/F. A day that was much shorter than days today because the moon was closer.

PP13 - Archaean Crustal Evolution

Figure at back of test: Plate Boundaries and Relationships

Below is a list of 15 features found on that cross section. Identify the **one** most appropriate name that corresponds to the lettered features on the cross section; leave the remaining 14 choices blank.

***Names to choose from to identify features on cross section
(This same list is with the illustration at the back)***

1A Accretionary prism: blueschist	2A Craton	3A Island (volcanic) arc orogeny
1B Backarc basin	2B Divergent continental margin	3B Remnant ocean basin
1C Collision orogeny	2C Divergent plate boundary	3C Rift plate boundary
1D Convergent plate boundary	2D Foreland	3D Suture zone
1E Cordilleran orogeny	2E Hinterland	3E Transform boundary

Feature E on the cross section is identified by which **ONE** of the terms; leave remaining 14 blank.

6. 1A, 1B, 1C, 1D, 1E
7. 2A, 2B, 2C, 2D, 2E
8. 3A, 3B, 3C, 3D, 3E

Feature F on the cross section is identified by which **ONE** of the terms; leave remaining 14 blank.

9. 1A, 1B, 1C, 1D, 1E
10. 2A, 2B, 2C, 2D, 2E
11. 3A, 3B, 3C, 3D, 3E

Feature J on the cross section is identified by which **ONE** of the terms; leave remaining 14 blank.

- | | | | | |
|---------|-----|-----|-----|----|
| 12. 1A, | 1B, | 1C, | 1D, | 1E |
| 13. 2A, | 2B, | 2C, | 2D, | 2E |
| 14. 3A, | 3B, | 3C, | 3D, | 3E |

Feature G on the cross section is identified by which **ONE** of the terms; leave remaining 14 blank.

- | | | | | |
|---------|-----|-----|-----|----|
| 15. 1A, | 1B, | 1C, | 1D, | 1E |
| 16. 2A, | 2B, | 2C, | 2D, | 2E |
| 17. 3A, | 3B, | 3C, | 3D, | 3E |

On the same cross section **Plate Boundaries and Relationships** are labeled three plates, which may or may not be plates.

18. Identify the labeled plates that contain *only one complete plate* (none, one, some or all).

Plate A, Plate B, Plate C,

West Greenland Area map at back. From what we can interpret just specifically from the information on this map we can say that during the Archaean . . . (True=Yes; False=No. None, one, more than one may be true)

19. T/F. Continents and oceans were distinct divisions.
20. T/F. Oceans were bigger than they are now.
21. T/F. Metamorphism was very high grade.
22. T/F. Igneous rock fractionation processes were fully developed.

True/False

23. T/F. By the end of the Archaean large continental blocks existed, but these were not nearly the size of modern continents.
24. T/F. The first land masses were quickly invaded by life.
25. T/F. The growth of the North American continent occurred by the continuous and uninterrupted accumulation of microcontinents and volcanic arcs.

PP14 - Supercontinent Cycles

26. T/F. North America achieved its current size by the end of the Proterozoic with the assembly of the Rodinia supercontinent about 700 million years ago.
27. T/F. Comparing Rodinia and Pangaea: one significant difference is that during Rodinia North America had continents sutured to its west coast, while during Pangaea the west coast was open to the ocean.

PP15 - Wilson Cycles

See Wilson Cycle Model Covering Two Pages At Back of Test

At the back of the test is a copy of the Wilson Cycle. The questions below are concerned with the rocks and structures developed at various stages of the cycle.

28. T/F. Rock 1 will most likely be a *basalt*.
29. T/F. Rock 2 will most likely be an *alkali granite*.
30. T/F. Rock 3 composing the volcano will most likely be an intermediate *diorite or plagiogranite*.
31. T/F. Rock 4 will most likely be the metamorphic rock *greenschist*.
32. T/F. Rock 5 will most likely be the metamorphic rock *blueschist*.
33. T/F. Rock 6 will most likely be in the *slate* ⇒ *phyllite* ⇒ *schist* ⇒ *gneiss* suite of rocks.
34. T/F. Rock 6 will most likely be a *quartz sandstone*.

<p>35. The events occurring during Wilson Cycle Stage B is/are: A Tension B Compression C Shear</p>	<p>36. The structural features developing during Wilson Cycle Stage H is/are: A Thrust faults B Horsts and graben C Folding (nappe structures)</p>
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37. T/F. **Stage D** - the volcano in the center of the ocean is most likely a hot spot volcano.

38. T/F. **Stage E** - the volcano is most likely a cinder cone.

Multiple Choice:

For the same Wilson Cycle model at the back, Stage I - Peneplained continent. During which stage in the Wilson Cycle did the lettered regions form?

Wilson Cycle Stages			
1A	Stage A	2A	Stage F
1B	Stage B	2B	Stage G
1C	Stage C	2C	Stage H
1D	Stage D	2D	Stage I
1E	Stage E		

<p>Feature J on the cross section; these rocks formed during which stage of the Wilson Cycle.</p> <p>39. 1A, 1B, 1C, 1D, 1E 40. 2A, 2B, 2C, 2D</p>	<p>Feature C on the cross section; these rocks formed during which stage of the Wilson Cycle.</p> <p>41. 1A, 1B, 1C, 1D, 1E 42. 2A, 2B, 2C, 2D</p>
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<p>Feature D on the cross section; these rocks formed during which stage of the Wilson Cycle.</p> <p>43. 1A, 1B, 1C, 1D, 1E 44. 2A, 2B, 2C, 2D</p>	<p>Feature M on the cross section; these rocks formed during which stage of the Wilson Cycle.</p> <p>45. 1A, 1B, 1C, 1D, 1E 46. 2A, 2B, 2C, 2D</p>
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PP16 - Contemporary Earth Tectonics

Power Point Maps: The maps are simple and basic, but based on your knowledge of contemporary Earth tectonics answer the following questions.

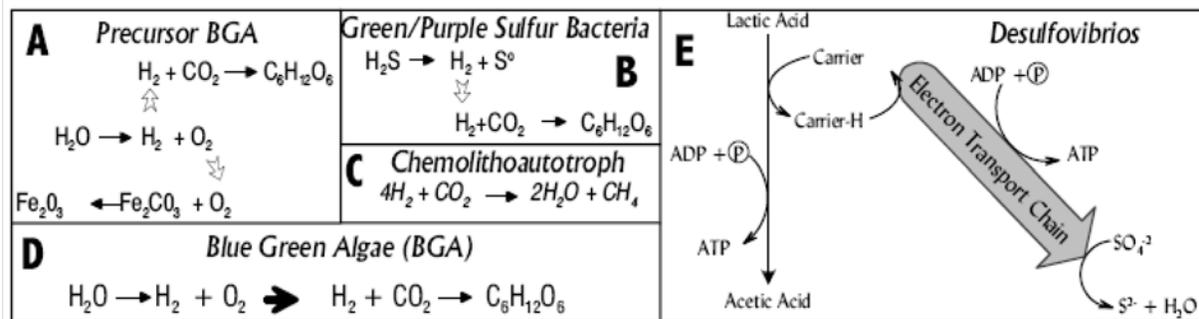
<p>Map One:</p> <p>TECTONIC FEATURE: Divergent plate boundaries are at which location (all that apply)?</p> <p>47. A, B, C, D, E</p>	<p>Map Two:</p> <p>TECTONIC FEATURE: Convergent plate boundaries are at which location (all that apply) ?</p> <p>48. A, B, C, D, E</p>
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<p>Map Three:</p> <p>Places where composite (strato) volcanoes are commonly found (all that apply)?</p> <p>49. A, B, C, D, E</p>	<p>Map Four:</p> <p>GEOLOGICAL RISKY PLACES: (all that apply)</p> <p>50. A=A, B=B, C=C, D=D, E=E 51. A=F, B=G, C=H, D=I, E=J</p>
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PP17 - Atmospheric Evolution

52. T/F. All the oldest forms of life in the Universal Tree of Life, are extremophiles, meaning they prefer to live in environments that are either hotter than boiling, strong acids, or salt deposits that are so salty nothing else can live there.
53. T/F. All extremophile organisms die in the presence of oxygen.

Multiple Choice: The figure below contains the biochemical reactions we discussed, and the organisms that do them. The questions below concern these reactions.



54. Identify the reaction(s) that remove carbon dioxide from the atmosphere (none, one, or more).
A Precursor BGA, **B Green/Purple Sulfur Bacteria**, C Chemolithoautotroph, **D BGA**, E Desulfovibrios
55. Identify the reaction(s) that put oxygen in the atmosphere (none, one, or more).
A Precursor BGA, **B Green/Purple Sulfur Bacteria**, C Chemolithoautotroph, **D BGA**, E Desulfovibrios
56. T/F. All the organisms that contribute to the reduction of carbon dioxide in the atmosphere when they die by carrying carbon into the sediment where it is sequestered.
A Precursor BGA, **B Green/Purple Sulfur Bacteria**, C Chemolithoautotroph, **D BGA**, E Desulfovibrios

PP18 - Biogeochemical Cycling

57. T/F. Without exception, all of the elements carbon, oxygen, hydrogen, sulfur, and nitrogen, require living systems as an intermediate step.

PP19 - It's the System !

58. T/F. In the Xnext (logistic) system we see sensitive dependence at all values of r, but at higher r values its sensitivity occurs at more decimal places.
59. T/F. Complex systems theory tells us that the more energy/information a system has to dissipate the faster changes comes.
60. T/F. We can usually detect when a system is approaching a bifurcation because its behavior becomes more and more erratic and unpredictable, but after the bifurcation is done it settles into stability again.
61. T/F. In a system everything is connected with everything else because the system can come into existence only by all parts evolving together through time.

Multiple Choice: The Bak-Sneppen ecosystem model for as simple as it is, provides many deep insights into how complex systems work. Which of the following insights come directly from analysis of the Bak-Sneppen model (True = yes; No = False.)

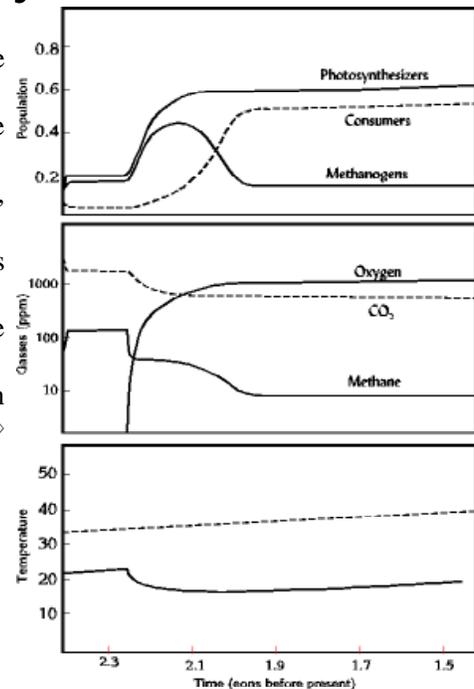
62. T/F. Avalanches affect the entire ecosystem equally.

63. T/F. The only way threshold fitness can lower is for the entire ecosystem to collapse so it has to start all over.
64. T/F. Avalanches are rare and become more rare with time.
65. T/F. Evolutionary change of both the individuals in the ecosystem and the ecosystem as a whole follow principles of punctuated change (sudden change followed by stability) rather than slow gradual change with time.
66. T/F. Most of the time there are no specific deterministic causes for an event, a specific thing that can be blamed for some disaster.
67. T/F. In a Bak-Sneppen world there is little a person can do to be safe because there is no way to become isolated and self sufficient.
68. T/F. One of the lessons from Bak-Sneppen is that true conservatives would not favor change because they are generally happy with the way things are.
69. T/F. Don't take avalanches personally; the disaster probably has nothing to do with you, what you did or did not do, believed or did not believe, tried or tried not to do.

PP20 - Gaia Theory

For the Daisyworld Model to the Right.

70. T/F. The rise of oxygen has absolutely nothing to do with the rise of methanogen bacteria.
71. T/F. The rise of oxygen occurs because of the evolution of the first photosynthesizers to appear in Earth history.
72. T/F. Consumers are just passive components in this system, appearing because oxygen appears.
73. T/F. The decline in temperature at 2.2 billion years ago is related to the rise of methane.
74. T/F. Methane declines in Earth history primarily because the population of methanogens declines.
75. T/F. In this graph, methanogen make a significant contribution to the decline in CO₂ because of the reaction $H_2 + CO_2 \Rightarrow CH_4 + H_2O$.



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