The Earth Doesn't Have an Environmental Problem

Sample Test
GenSci 102 Final Exam
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

PP21 - Environmental Changes: Glaciations

1. T/F. As the energy from the sun has increased with time, glaciation events have become less frequent and less intense with geologic time.
2. T/F. Carbon dioxide is the principle greenhouse gas because it is about 21 times more efficient at trapping infrared heat than any of the other greenhouse gasses.
3. T/F. Carbon dioxide has steadily declined at a uniform rate in the Earth's atmosphere over geologic time as photosynthesizing organisms have become more widespread.
4. T/F. The Snowball Earth glaciation was initiated by a runaway positive feedback loop that started with weathering, that sucked down CO_2, that cooled the Earth, that lead to ice formation, that led to increasing albedo, that led to increased cooling, and so on.
5. T/F. Because the Pleistocene glaciation is the most recent one, we understand better than for the others why it started.

PP22 - Environmental Changes: Sea Level

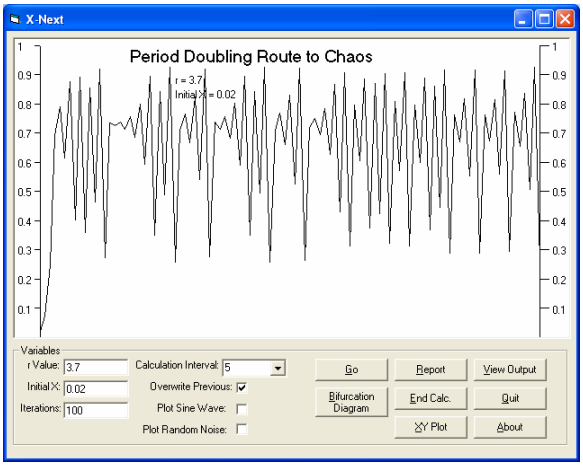
6. T/F. Sea level is more highly influenced by glaciation events (advance and retreat of glaciers) than they are by tectonics (Wilson and supercontinent cycles).
7. T/F. Sea level has peaked at maximum high stand three times in the past 600 million years, but today we are near one of the lowest sea level stands.
8. T/F. The Black Sea region is a freshwater lake farming valley drowned in less than a year by a catastrophic flood emanating from a sea level rise in the Atlantic ocean about 5500 years ago (7500 before present).
9. T/F. Sea level has dropped low enough in the past 10 million years that the Mediterranean sea became isolated from the world's oceans, and completely dried out so one could walk from Italy to Africa without getting wet.

PP23 - Environmental Changes: Extinctions

10. T/F. Before the Pleistocene megafaunal extinction 12,000 years ago North America was like modern East Africa with large herds of horses, camels, rhinos, pigs, elephants and mastodons roaming across the entire continent.
11. T/F. The Pleistocene megafaunal extinction is an example of a Field of Bullets extinction: random extinction without regard to differences of fitness.
12. T/F. The extinction of the dinosaurs at the end of the Cretaceous has an exotic cause, as evidenced by the iridium layer, that is rare on earth but common in meteorites.
13. T/F. The Permian extinction is like a "perfect storm" of positive feedback triggered by a quick pulse of massive volcanism in Siberia that eventually let to a rapid drop in atmospheric oxygen that asphyxiated about 90% of the species on the planet.

PP24 - Attractors, Hysteresis, and Bistable Behavior

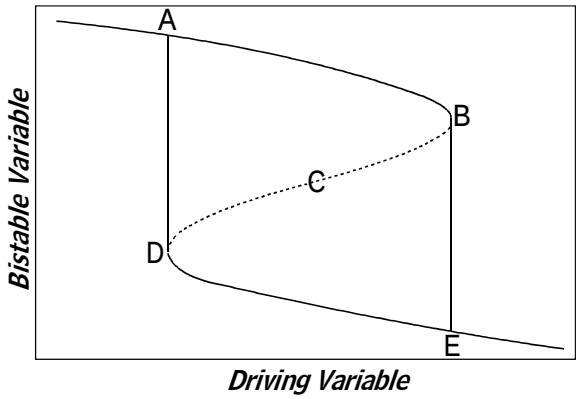
14. T/F. Strange attractors are called strange primarily because they produce patterns in phase space with no easily recognizable form, like the time series diagram to the right.
15. T/F. Phase space differs from real space primarily in the fact that time is no longer a variable in the data.
16. T/F. The time series to the right would plot in phase space as a strange attractor.



Multiple Choice:

In the Hysteresis diagram to the right, the system is sensitive dependent (at the tipping point) at which point (more than 1).

17. A, B, C, D, E



In the Hysteresis diagram to the right, the system is becomes increasingly unstable from (one choice):

18. A = **A ➜ B,** B = **B ➜ A**, C = **B ➜ D**, D = **D ➜ E**, E = **B ➜ E**

At location C on the hysteresis diagram (1 choice; True = Yes, False = No):

19. T/F. Nothing ever exists here because the energy of the entire system is too high.
20. T/F. This area is unstable and the system passes through it quickly.
21. T/F. This is an equilibrium condition between two bistable states.
22. T/F. In the bistable system this is the bistable point.

Properties of Bistable Systems. True if the statement is a characteristic of a bistable system; False if not a characteristic of a bistable system.

23. T/F. For a bistable system to reach a tipping point it usually requires a runaway positive feedback cycle to increase the r value of the system.
24. T/F. Have a lag between cause and effect because to reach the tipping point the system must be taken far from equilibrium and that requires an increasing input of energy to increase the r value.
25. T/F. Even though we can directly observe the *behavior* of a bistable system the energy *driving* the system is usually not directly observable because it is not represented in the diagram.
26. T/F. Once through a tipping point it is impossible for the system to return to its former state just be simply reversing the conditions because, like the sand pile, it must rebuild to another critical state to avalanche again.
27. T/F. If we increase the r value of a bistable system the system may switch to being a limit cycle system.
28. T/F. Does not have dependent and independent variables because the variables driving the system must be coupled so that a rise in one variable causes the other variable to fall, and vice versa.
29. T/F. Because bistable systems can exist in markedly different states under virtually identical conditions, and because bistable systems behave fractally, it may not be possible over short observation times to know which way the system is evolving.
30. T/F. Bistable systems tend to produce behaviors that repeat with such regularity that we can predict the future states of the system with some confidence.

31. T/F. The behavior of bistable systems tells us that most change is slow, but it is punctuated periodically by rapid changes that are unpredictable.

PP25 - Climate and Environment

32. T/F. We can measure ancient temperatures during evaporation because the ^{18}O evaporates (fractionates) more easily than ^{16}O atoms.
33. T/F. Negative numbers of ^{18}O mean the temperature is more warm than when the ^{18}O is positive.
34. T/F. The best oxygen isotope data comes from ice rafted debris deposited on the ocean floors through time and retrieved by drilling ships.
35. T/F. In cores retrieved from the ocean floor by drilling, the smallest ice age climate events we see are the 750 year Heinrich events that show up coarser ice rafted debris layers within the ocean clays.
36. T/F. Volcanic eruptions, particularly the large rare ones, have been significant in causing tipping points in the Earth's climatic history.
37. T/F. Milankovitch cycles are patterns found in sediments deposited on the ocean floor during an ice age.
38. T/F. Precession refers to changes in the direction the axis of a rotating object like the earth is tilted and is the process responsible for the glacial and interglacial cycles in the northern hemisphere.
39. T/F. Variations in the Earth's rotations occur in three modes at 100,000 years, 41,000 years, and 23,000 years, but because of constructive and destructive interference patterns when the three are added together the larger 100,000 year signal is often masked in the noise of the smaller events.

PP26 - 65 Million Years of Climate Change

40. T/F. Temperature curves show that climate did not steadily get cooler during the past 65 million years, but dropped, stabilized, dropped again, stabilized again, and then finally dropped into the recent ice age in each slide.

Power Point Slides:

Biomes. In the box to the right are listed in alphabetical order the various biomes (plant communities) we discussed. On the power point are a pictures of some biomes. Identify the biome

Biomes: Plant Provinces

1A	Deciduous	2A	Steppe
1B	Mediterranean scrub	2B	Taiga (boreal)
1C	Mixed deciduous/taiga	2C	Tundra
1D	Rain Forest		
1E	Savannah		

Multiple Choice

Biome One: 41. 1A, 1B, 1C, 1D, 1E 42. 2A, 2B, 2C,	Biome Two: 43. 1A, 1B, 1C, 1D, 1E 44. 2A, 2B, 2C,
Biome Three: 45. 1A, 1B, 1C, 1D, 1E 46. 2A, 2B, 2C,	Biome Four: 47. 1A, 1B, 1C, 1D, 1E 48. 2A, 2B, 2C,
Biome Five: 49. 1A, 1B, 1C, 1D, 1E 50. 2A, 2B, 2C,	Biome Six: 51. 1A, 1B, 1C, 1D, 1E 52. 2A, 2B, 2C,

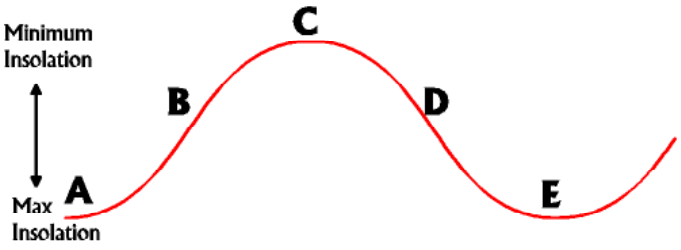
53. T/F. The taiga biome typically occurs directly to the south of the tundra biome.
54. T/F. During the past 65 million years biomes of central North America evolved from tropical rain forest, to Mediterranean scrub, to savannah, to steppe.

PP27 - The Recent Ice Age

55. T/F. From the first records of glacial ice about 2.75 million years ago, the ice has advanced and retreated about 40 times; that is there have been about 40 ice ages.
56. T/F. From the first recorded glaciers up to the present day, ice age cycles have tended to get longer and bigger (swings between warm and cold are greater).
57. T/F. The last four ice age cycles (advances and retreats of the glaciers) have taken about 100,000 years from maximum warming to deepest cooling.
58. T/F. At the height of the last glacial maximum most of Europe had been turned into tundra, while present day Europe (France and Germany) is mostly deciduous forest.
59. T/F. Methane and carbon dioxide both track temperature changes closely, but they do so for different and unrelated reasons.

60. T/F. Monsoon cycles are changes in rain fall patterns caused by differential heating of the land and oceans; during the hot season land heats faster than water, develops low pressure, which causes the air to rise, drawing moisture laden winds off the ocean, which precipitate as rain.

Multiple Choice: Insolation curve. Below is a solar insolation curve. These questions explore the changing conditions during a glacial cycle using this curve.



61. The northern hemisphere is tilting closer to the sun at which points (all that apply).
    A. B. C. D. E
62. Glacier are at their maxima at which points (all that apply).
    A. B. C. D. E
63. Tundra is at its maximum distribution at which points (all that apply).
    A. B. C. D. E
64. Monsoons are at their maximum at which points (all that apply).
    A. B. C. D. E
65. The beginning rise of methane resulting from rice farming occurred where?
    A. B. C. D. E
66. Loess become more widespread at which points (all that apply).
    A. B. C. D. E

67. T/F. Lakes dry out from C to E on the insolation curve.
68. T/F. Methane increases from A to C.
69. T/F. Today we are closer to the conditions at C on this curve than the conditions at A.

PP28-29 - The Human System and the Great Wave

According to William Perry . . .

70. T/F. In individual development, rebellion at stage 5is initiated more because we come to believe that authorities have abandoned us—cease to be able to give us the answers we need—than rebelling against what they are telling us to believe.
71. T/F. If a person is in the position of "playing the game", asking questions like "Just tell me what I have to know" they are doing so because they don't believe authorities have any meaningful answers, but they are afraid that the authorities will punish them if they do not look like they are cooperating.

72. T/F. The most dangerous time for an individual is when they confront the reality that they must make decisions in what appears to be a completely ambiguous and arbitrary world where nothing seems to offer any meaning or certainty.

73. T/F. All fundamentalist movements in the world are virtually identical regardless of the specific beliefs, and can be recognized by their intolerance, narrowness, and inability to compromise.
74. T/F. Epidemics of Accusations (witch crazes, minority baiting, Satanic panics, etc.) all become more likely when a society evolves by positive feedbacks to a critical anxiety level.
75. T/F. Epidemics of Accusations normally begin to die out when people finally get tired of or bored with the process.
76. T/F. Economic and cultural crises, and even collapses, are initiated by times of material progress, cultural confidence, and optimism for the future because it is these times that allow populations to outstrip the ability of resources to sustain them.
77. T/F. During the cresting of a great wave things go from bad to worse not because people are willfully bad, but because just to survive they make choices that are designed to reduce their anxiety, but which by necessity increases the anxiety of others.

PP30-31 - Human Civilization and Environments

78. T/F The best evidence we have today indicates that humans began changing the environment at least 5000 years ago—or even before—, that indeed, human activity has probably prevented a normal ice age from happening.
79. T/F When we say that the human species is an 'r" selection species we mean that our population has grown exponentially, but when we say it has 'k' selection features we mean we diminish the large fluctuations in the population with improved nutrition, medicines, and other technological advances that allow the population to grow far beyond the carrying capacity of the environment.
80. T/F The development of city states was an inevitable result of a positive feedback loop where farming led to the necessity of strong leaders, that led to specialized labor, that led to more efficient farming, that lead to expanding population.
81. T/F The historical record points to the fact so far in human history virtually no society from the simplest to the most sophisticated has learned or understood enough to be able to prevent inevitable disaster when the favorable conditions that allowed their growth went away.