

Sample Test  
GenSci 102: Test # 1  
The Origins of Order

Total points = 139

GENSCI 102A - ENVIRONMENT EARTH

**THE ORIGINS OF ORDER**

**(THE SEARCH FOR MEANING AND EVOLUTIONARY PROCESSES)**

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**INSTRUCTIONS:**

- ☞ **Write your social security number on the Scantron card.** Your test score will be sent to you via e-mail. If you do not have e-mail, you can see me for your score
- ☞ 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 and Multiple Choice questions. The different kinds of questions are mixed through the test.

- ☞ 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; e.g. question 24 has choices 1-5, question 25 choices 6-10, etc.
- ☞ Different questions may have different values, as indicated with each set of questions.
- ☞ Drawing, diagrams, figure 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.

- ☞ Observe that on some of the questions the scoring will be "rights minus wrongs." Such questions are labeled. That is, you get points for a right answer, zero for no answer, and a negative score for wrong answers. Don't guess!

- ☞ Wrong spellings are not part of the test. I do not deliberately make minor errors, 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 raw score will be sent to you via e-mail. The raw score is not your grade, but I will send the curve ranges to you also so you have an idea how you did. Check the bulletin board opposite my office (Miller 233) for the final curve.**

**True/False QUESTIONS; 2 points each, 14 points total:**

1. T/F. The Cognitive Imperative finds mythical answers to questions.
2. T/F. The Cognitive Imperative can be improved with training.
3. T/F. As civilization has advanced, the role of myths in human culture has declined.
4. T/F. Myths are generated principally by the right hemisphere of the brain.
5. T/F. The binary operator in d=Aquili=s neural operators is primarily concerned with counting as a basis of arithmetic.
6. T/F. The holistic operator can be said to see trees, not forests.
7. T/F. When someone has a religious Aexperience@it comes from the causal operator.

**RIGHTS MINUS WRONGS MULTIPLE CHOICE QUESTIONS: 3 points each, 15 points total.** In the box to the right are 10 choices you can use for the questions below. Of the *10 choices* in each box, *choose only the one* which answers the question. Leave all others blank.

**SELECT FROM THESE**

1A	Analytical	2A	Induction
1B	Aristotle	2B	Plato
1C	Deduction	2C	Pythagoras
1D	Dialectic	2D	Socrates
1E	Empirical	2E	Syllogism

Identify the *"truth"* we learn from our *senses*. Leave the other 9 spaces blank.

8.    **1A**    **1B**    **1C**    **1D**    **1E**  
 9.    **2A**    **2B**    **2C**    **2D**    **2E**

Identify the *philosopher* associated with the "truth" in the last question. Leave the other 9 spaces blank.

10. **1A**    **1B**    **1C**    **1D**    **1E**  
 11. **2A**    **2B**    **2C**    **2D**    **2E**

Identify the *"truths"* derived from *deductive logic*. Leave the other 9 spaces blank.

12. **1A**    **1B**    **1C**    **1D**    **1E**  
 13. **2A**    **2B**    **2C**    **2D**    **2E**

Identify the *philosopher* associated with the *syllogism*. Leave the other 9 spaces blank.

14. **1A**    **1B**    **1C**    **1D**    **1E**  
 15. **2A**    **2B**    **2C**    **2D**    **2E**

Identify the **method** associated with the **learning from the senses**. Leave the other 9 spaces blank.

16. 1A 1B 1C 1D 1E

17. 2A 2B 2C 2D 2E

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**TRUE/FALSE QUESTIONS; 2 points each, 26 points total:**

18. T/F. The psychological defect in induction is that our brains are constructed in such a way that there are certain kinds of sensory information we cannot process.
19. T/F. The logical defect in induction is that we cannot generalize from some observations to all observations.
20. T/F. The dialectic is a method of inductive logical analysis where truth is explored through a series of questions and answers.
21. T/F. Karl Popper's main criticism of traditional scientific methods was that because you can only see what you are looking for we get caught in a loop of circular reasoning where, because theory tells you what to look for, we cannot see problems with the theory.
22. T/F. In Bronowski's ATo and Fro@model of science, induction always precedes deduction.
23. T/F. The goal of science is to discover truthful facts about the world by making empirical observations.
24. T/F. Models can be mathematical expressions, or actual physical models that help us understand how a part of the world operates, but do not include drawings or illustrations.
25. T/F. Determinism means that the outcome of something is known and chaos theory has confirmed that this is true.
26. T/F. Philosophically one can have a **vitalist** viewpoint without being a **finalist**, but one cannot be a **finalist** without being a **vitalist**.
27. T/F. The second law of thermodynamics states that although in general things are running down, in some parts of the universe complexity can increase.
28. T/F. A dissipative structure and an open system are essentially different names for the same

thing.

29. T/F. A power law distribution is one in which large events (avalanches) are infrequent and do not have much influence in the natural world, while the numerous small and medium size events cause most of the changes.
30. T/F. One of the main feature of a SOC system is that it self evolves to the complex state and then as avalanches begin into the chaotic state.

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**RIGHTS MINUS WRONGS MULTIPLE CHOICE QUESTIONS: 3 points each, 42 points Total.**

At the back of the test (or projected as an overhead) is a page containing 15 illustrations dealing with perception, science, chaos, and complexity. Of the **15 choices** in each box, **choose as many** as are appropriate and necessary to answer the questions in the boxes below. Note that some questions (e.g. 32, 33, 34, etc.) may end up with no answer at all, and some illustrations may answer more than one question.

**Fixed Attractor:** mark one or more of the 15 choices directly exhibiting this property.

31. 1A    1B    1C    1D    1E

32. 2A    2B    2C    2D    2E

33. 3A    3B    3C    3D    3E

**Chaotic Attractor:** mark one or more of the 15 choices directly exhibiting this property.

34. 1A    1B    1C    1D    1E

35. 2A    2B    2C    2D    2E

36. 3A    3B    3C    3D    3E

**Fractal Geometry:** mark one or more of the 15 choices directly exhibiting this property.

37. 1A    1B    1C    1D    1E

38. 2A    2B    2C    2D    2E

39. 3A    3B    3C    3D    3E

**"You can only see what you are looking for":** mark one or more of the 15 choices which illustrate this phrase.

40. 1A    1B    1C    1D    1E

41. 2A    2B    2C    2D    2E

42. 3A    3B    3C    3D    3E

**"You just can't trust your own eyes":** mark one or more of the 15 choices which illustrate this phrase.

43. 1A	1B	1C	1D	1E
44. 2A	2B	2C	2D	2E
45. 3A	3B	3C	3D	3E

**SAME ILLUSTRATIONS AS LAST QUESTIONS, BUT TRUE/FALSE QUESTIONS; 2 points each, 10 points total:**

46. T/F. *Non-linear phenomena*: Illustration **2C** is an example of a non-linear phenomena.
47. T/F. *Bifurcation*: Illustration **3E** is an example of bifurcation.
48. T/F. *Iteration*: Illustration **1E** is produced by iteration.
49. T/F. *Emergent Property*: Illustration **1C** is an example of an emergent property.
50. T/F. *Emergent Property*: Illustration **3D** is an example of an emergent property.

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**GENERAL TRUE/FALSE QUESTIONS; 2 points each, 20 points total:**

51. T/F. The *computational viewpoint* argues that the universe behaves like a computer calculating out the laws of nature.
52. T/F. A major difference between Euclidian and Fractal geometry is that in fractal geometry the geometric figure is generated by iteration with each iterations scaling to smaller and smaller sizes.
53. T/F. The following phrase is an example of negative feedback: **AA self-fulfilling prophesy.**@
54. T/F. A *strange attractor* differs from an oscillatory attractor because although both cycle around a focus point, a strange attractor never repeats itself.
55. T/F. It is reasonable to say that a fountain behaves like a strange attractor.
56. T/F. In general, when information flows very easily a system tends to becomes unstable. For example, in the cellular automata program we worked with (Life3000) high information flow tended to produce chaotic behavior.
57. T/F. In a cellular automata, lowering the number of birth neighbors increases the ease with which information flows tending it toward more chaotic behavior.
58. T/F. Genetic drift occurs mainly in large populations which are undergoing gradual evolutionary change due to shifting environmental conditions.

59. T/F. The creation of a new species is more influenced by positive feedback than negative feedback.
60. T/F. In Elizabeth Vrba's Turnover Pulse Hypothesis species sorting is an example of positive feedback because it represents an increase in the number of species.

**MULTIPLE CHOICE QUESTIONS: 3 points each, 6 points Total:**

Below is the quote we read and analyzed from The Origin of Species by Charles Darwin, only it is divided into 5 phrases.

- A** "As many more individuals of each species are born than can possibly survive; . . .
- B** . . . and as consequently, there is a frequently recurring struggle for existence, . . .
- C** . . . It follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, . . .
- D** . . . will have a better chance of surviving, . . .
- E** . . . and thus be naturally selected."

61. **A, B, C, D, E:** Identify the one phrase which represents the *positive feedback*..
62. **A, B, C, D, E:** Identify the one phrase which represents the *negative feedback*..

Steven Wolfram observed that different Cellular Automata rules (birth and survival neighbors) produced 4 different classes of behavior. These different behaviors parallel the behavior of chaotic systems in general.

- A. CLASS ONE: FIXED BEHAVIOR**                      **C. Class Three: Chaotic Behavior**  
**B. CLASS TWO: OSCILLATORY BEHAVIOR**      **D. Class Four: Complex Behavior**

63. The 9 generations of cellular automata below illustrate which of the four classes of behavior listed above: A, B, C, or D. One answer only. Six points for selecting the right choice; 3 points for selecting the 2<sup>nd</sup> best choice; 1 point for selecting the 3<sup>rd</sup> best.





