

KEY TO SAMPLE TEST NUMBER1
THE ORIGINS OF ORDER
THE SEARCH FOR MEANING AND EVOLUTIONARY PROCESSES

Some General Comments on the Tests.

These are True/False and Multiple Choice questions but they are different from most of the other such tests you may have taken. Some of the rules that apply to tests in other classes do not apply here. For example, all 5 mark sense spaces for a question number may be left blank and still be the right answer. Or, more than one mark sense space on one row may be correct. The computer program used to grade these tests is different from the one most other profs use, so just read the questions and answer them as instructed.

Some more specific cases. The Multiple Choice questions often run over 10 or 15 (or more) choices spread across 2 or 3 (or more) question numbers on the test, each question number with 5 mark sense spaces. Sometimes there is only one right choice for a question, and then only 1 of the 10-15 choices is to be selected. This leaves two rows of mark sense spaces blank. In these cases it is correct to leave the entire row(s) blank; that is the correct answer for that row.

In other Multiple Choice questions there may be more than one right answer spread over several question numbers, and there may be more than one right answer on a particular row, and none on another row. This is also normal.

And sometimes, not all 5 choices may be used. For example, the choices may be A, B, or C. In these cases D and E are not scored by the computer, but be sure to leave them blank.

MYTHS AND THE ORIGINS OF TRUTH

1. True -
2. False - the cognitive imperative is something we are born with, hard wired into our brains. It is instinctive and reflexive. Short of brain damage that destroys it nothing can be done to change it.
3. False - myths are universal. There are personal myths, family myths, tribal myths, national myths. In some senses even scientific solutions are myths, in that they can become accepted reflexively, without critical examination. However, scientific myths differ from other myths in that the scientific method has build in mechanisms that continuously question our theories and models. But to be human is to be a myth maker.
4. False - myths require both hemispheres. The left hemisphere sets up the problem analytically, the right hemisphere then solves it holistically.
5. False - the binary operator works by polarizing information into its opposites.
6. False - just the opposite. Holistic is the whole, not the pieces.
7. False - the causal operator looks for the "causes" of things. It is an analytical analysis. The religious experience is emotional and comes from the limbic system..

Multiple Choice.

8. 1E
9. None

10. 1B
11. None

- 12. 1A
- 13. None

- 14. 1B
- 15. None

- 16. None
- 17. 2A

True/False

- 18. False - the psychological defect in induction is that we can only see what we are looking for.
- 19. True - just because all the crows I have seen are black (some observations), does not mean that all crows must therefore be black (all observations).
- 20. False - sorry, tricky question. You have to read very carefully. The dialectic is deductive not inductive.
- 21. True - circular reasoning is a problem with all human thinking, and must be deliberately dealt with to be overcome. Most of the time with myths there is no incentive to prove the myth wrong. We believe the myth because we emotionally or psychologically “need” to believe the myth. Science is the only enterprise that has built in, systematic mechanisms to overcome the biases of circular reasoning. Even still, individual scientists often cannot escape the circular reasoning of something they very much want or need to believe in. In science it is the responsibility of other scientists to break the circular reasoning loop.
- 22. True - one of the core principles of science is that nature is always the final arbiter of what is true or not. Since nature is always the ultimate source of truth, it is necessary for science to start with nature, inductively. Indeed, every scientific revolution that overthrows one theory in favor of another occurs because observation (induction) shows the old theory to be wrong. The contrast here are belief systems where theory (deduction) is the final arbiter of truth. “We believe this to be true, it logically follows from this belief that this other thing must also be true, therefore it is true.” You know, like the earth is the center of the universe and everything revolves around it.
- 23. False - this is one of those questions where you want to say, “It depends.” There are ways of arguing this that could make it true. But cutting through all the slight of hand it comes down to, “There is no such thing as an unbiased observation.” You can’t get truth by observation because you can only see what you are looking for, which means you cannot see what you are not looking for, so empirical observations cannot give you truth. Or if it does it does so by accident, and you can never be sure if you have truth or not.
- 24. False - a model is any attempt to illustrate a part of the natural world.
- 25. False - the real distinction here is between determinism and predictability. Determinism means that the outcome is inherent in the starting state. That outcome may be so complex we cannot know it ahead of time, but the resolute workings out of the process is inherently logical. Predictability means that we can know the outcome. For a long time when something was said to be deterministic it was also believed to be predictable. Chaos theory has demonstrated that is not true. Sensitive dependence on initial conditions shows that a deterministic process can be so complex the outcome is inherently

- unknowable ahead of time. We just have to do the calculations to see what will result.
26. True - finalism virtually always contains the concept of life forces that exist independent of physical bodies, or that inhabit inanimate objects, such as rocks or mountains.
 27. True - the classical 2nd law argued, indeed, that all things *are* running down; period. But the new non-equilibrium thermodynamics demonstrates that open systems are inherently self evolutionary. That they will increase in order and complexity with time.
 28. True - a dissipative structure dissipates energy/information with its environment to maintain itself, and that is virtually the definition of an open system.
 29. False - just the opposite. The one big event virtually always makes a more dramatic change, and has much more influence than all the little fluctuations.
 30. False - SOC systems always remain perched right on the edge of chaos, but do not cross over into it, except momentarily. Remember the sand pile. You can only pile it up so steep, and then it will avalanche down to a more stable state. You cannot pile it up indefinitely to greater and greater levels of chaos. It always self deflates to stability.

Multiple Choice - rights minus wrongs. Answer all that apply.

31. None
32. 2B
33. 3A, 3B

34. None
35. 2D
36. 3D

37. 1E
38. 2A
39. 3C, 3E

You can only see what you are looking for means you have a build in model of reality that you impose on the world. It does not include pure optical illusions that exist intrinsically, regardless of how you think about the world.

40. 1A
41. None
42. None

You just can't trust your own eyes means what is out there can fool you; the problem is not necessarily in you. Optical illusions belong here because we do not impose an interpretation from preformed concepts.

43. 1B, 1C, 1D
44. 2C
45. None

46. False - non-linear is a mathematical concept and optical illusions do not fall into this concept.

47. False - this is another one of those, "It depends" answers. You want to explain your answer. 3E is a fractal image, and that would be the right answer, but in its generation there are bifurcations, so the answer could be true too. When I gave his question (I don't use it anymore) I accepted both true and false.
48. True - the line is divided, and divided again, and again, ad infinitum.. The same operation is done over and over. To do something over and over is to iterate it.
49. False - 1C is an optical illusion. An emergent property is one in which the whole is more than the sum of the parts.
50. True - 3D is the Lorenz attractor, and is an emergent property in that it is an unexpected outcome of a deterministic but unpredictable iteration process of an equation. Just looking at the figure might not let you know that, so it requires understanding how the figure is formed.
51. True -
52. True -
53. False - a self fulfilling prophesy is one in which the direction you are already going is expected to happen, and that is how positive feedback, not negative feedback, is defined.
54. True - a strange attractor does indeed cycle around a focal point, an attractor, it just never does it the same way.
55. True - a fountain is like a strange attractor. It has an overall form or shape that is recognizable, but the exact shape of the fountain changes continuously, and never repeats itself.
56. True - high, easy information flow tends to overload a system, causing it to oscillate more and more erratically.
57. True - lowering the number of birth neighbors in a cellular automata increases the ease of information flow. Say the rule says 4 birth neighbors, while another says 2. It is easier to have 2 neighbors alive than 4, and the number having 2 will be more than the number having 4, so information flows more easily.
58. False - genetic drift occurs easier in smaller populations because it easier for a gene to show up in a fewer number of individuals than in many individuals.
59. True - positive feedback increases information flow, keeps a system going in the direction it is already going, and the creation of new species requires an increase in the information, which results from increased information flow.
60. False - species sorting is negative feedback. It is the elimination of some species, which is diminishing of the amount of information; negative feedback.
61. Choice A
62. Choice B
63. 1st choice D; 2nd choice B; 3rd choice C.

There are many questions similar to these that can be asked. Make up your own questions and quiz each other. It is a good way to study.