

**Biology 213 Fall Quarter 1996 Test 1 Dr. Bryant Page 1 of 5**

NAME: \_\_\_\_\_ KEY \_\_\_\_\_ SCORE: 100 /100

Notes:

1. Make sure you have your name on the test.
2. Make sure you have the correct number of pages — check now!
3. Be sure to show ALL your work on problems — credit is given for correct steps in solving the problem. The correct answer without a clear showing of the derivation of the answer will receive little or no credit.
4. Maintain silence throughout the test.
5. For multiple choice questions, put the letter of the correct answer in the blank to the left of the question number.
6. DO NOT GET UP — if you have a question, raise your hand and the instructor will come to you.
7. Read the questions carefully — misreading is a primary cause of point loss. Also be sure to answer the question that was asked.
8. USE ONLY THE SPACE GIVEN BELOW THE QUESTION TO WRITE YOUR ANSWERS
9. Papers are due on the instructor's desk at 2:05 PM. **NO LATE PAPERS WILL BE ACCEPTED!!** Class will resume at 2:15 PM, and last until 2:50 PM.

1. (6) Define the word hypothesis as used in science and give 2 of the 4 characteristics of a good hypothesis

- a. A hypothesis is **a carefully thought-out and perhaps preliminarily-tested explanation for a natural phenomenon.**
- b. one characteristic of a good hypothesis is **it must be internally consistent.**
- c. Another characteristic of a good hypothesis is **it must have explanatory value. (it should be consistent with known information it must be able to be tested empirically)**

c (d OK) 2. (5) A theory, as the term is used in science, is: a. just a guess about how something happened b. an initial, well thought-out explanation of an observation, but without much, if any, supporting evidence c. an explanation which has been tested and supported to a reasonable degree d. an explanation which has been thoroughly tested and supported beyond all reasonable doubt

3. (10) Briefly compare and contrast science and one other way of knowing. Tell at least one similarity (the compare part) and one difference (the contrast part). Be sure to tell what it is that makes science different from other ways of knowing (the criterion of demarcation).

*Art and Science. Science attempts to derive explanations for natural phenomena, art attempts to elicit emotional responses from humans. They are similar in that they both satisfy some portion of a human desire to know. They are very different in the way that knowledge is obtained. Scientific explanations of natural phenomena must be empirically falsifiable (criterion of demarcation). Artistic expression tries to give sensual expression to human emotions; it is judged by art experts, not by empirical testing.*

4. (17) List, in order, starting with the most ancient, the periods and the eras to which they belong. Give the approximate dates for the start and end of each era.

FOR EACH ERA, list a typical life form that existed in that era. "Typical" means either a common form that lived in no other era, or a common form that may have lived in another era(s), but which was not a dominant life form except in the era you list it in.

<i>Paleozoic era</i>	<i>~600-~225Ma</i>	<i>Trilobites</i>
<i>Cambrian</i>		
<i>Ordovician</i>		
<i>Silurian</i>		
<i>Devonian</i>		
<i>Carboniferous</i>		
<i>Permian</i>		

<i>Mesozoic Era</i>	<i>~225-65Ma</i>	<i>Dinosaurs</i>
<i>Triassic</i>		
<i>Jurassic</i>		
<i>Cretaceous</i>		

<i>Cenozoic Era</i>	<i>65Ma - present</i>	<i>large mammals &amp; large birds</i>
<i>Tertiary</i>		
<i>Quaternary</i>		

5. (16) If one atom out of every 6 billion atoms of  $^{133}\text{Xz}$  decays to  $^{132}\text{Qf}$  in a year, and you find a rock in which 8% of the original  $^{133}\text{Xz}$  has decayed to  $^{132}\text{Qf}$ , how old is the rock?

$$t = \frac{1}{r} \ln \frac{N_0}{N_t} \qquad r = \frac{1}{6000000000}$$

$$t = 6000000000 \ln \frac{1}{.92} = 6000000000(.08338) = 500,289,653.64$$

*or, a little over 500 million years*

6. (6) Explain, very briefly, why fossil hunters seem to prefer to do their fossil hunting in deserts.  
*No plants to cover the ground makes fossil hunting much easier. Fossils which decay out of the rocks don't disintegrate as fast in the dry air.*

7. (20) Having read Chapter 3 in your book carefully, explain what you think is the single best line of evidence for organic change through time (i.e., evolution in lineages of living organisms). Tell what the evidence is, and why you think it is the best evidence. Stay within the bounds of science in your explanation. Try to design your explanation like a scientific paper; in other words, do a thought experiment on paper. Set up an empirical test of the following sort: If lineages evolve through time, the following must happen; if they didn't change through time, we would find this alternative instead. Then tell what has actually been found.

*Fossil forms are, I believe, the single best line of evidence for evolution. If lineages have evolved through time, and if occasionally organisms are buried in current sediments and fossilized, we would expect the following: the more different the fossil from modern forms, the more ancient the rock should be in which it is buried. If all forms were created at once and have survived from then on, there should not be such things as fossils of organisms different from modern forms. Clearly, however, there are. Furthermore, radiodating of the rocks shows exactly what we would expect if lineages evolved: the more different the fossil from modern forms, the more ancient the rock should be in which it is buried. For the most part, the deeper the rock under the surface, also the more different the fossil from modern forms; however, occasionally rocks are folded so their order is not with the oldest on the bottom. The above argument presupposes that fossils are the remains or the casts of remains of once-living organisms; there can be no reasonable doubt about this, since fossils in all stages of formation are readily found, even fossils of modern organisms.*

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8. (20) List, in order, 5 human ancestors, giving approximate dates when they lived, and for each, tell whether it made stone tools, and approximately what size its brain was compared to modern humans. Use the following table to record your answers.

Name of Ancestor	Approximate Dates	Made stone tools? (Y/N)	Small, medium or large brain?
<i>Australopithecus afarensis</i>	~3.8-2.8 Ma	N	small
<i>Australopithecus africanus</i>	~3-2 Ma	N	small
<i>Homo habilis</i>	~2.2-1.6 Ma	Y-crude	medium
<i>Homo erectus</i>	~1.6 - 0.4 Ma	Y-good	large
<i>Homo sapiens</i>	~0.4 Ma - present	Y-excellent	large