AP Biology Test: Evolution — Multiple Choice Question Themes

1. If Lamarck's hypothesis of species modification were true, the children of a person who developed large muscles by lifting weights would be born with

2. Darwin's theory of descent with modifications states that

3. Toads in a particular population vary in size. A scientist observes that in this population, large males mate with females significantly more often than small males do. All the following are plausible hypotheses to explain this observation EXCEPT:

4. Which of the following principles is NOT part of Darwin's theory of evolution by natural selection?

5. The wing of a bat, the flipper of a whale, and the forelimb of a horse appear very different, yet detailed studies reveal the presence of the same basic bone pattern. These structures are examples of

6. Although the seal and the penguin both have streamlined, fishlike bodies with a layer of insulating fat, they are not closely related. This similarity results from

7. Natural selection could **not** occur without

8. **Directional** selection occurs when

9. An isolating mechanism in which mating between two groups is prevented because each group possesses its own characteristic courtship behavior, is called

10. The evolution of a new species within the same geographical region as the parent species, is called

11. A large population that is reduced to a few surviving individuals is said to have gone through a(n)

12. Which statement is **not** true about natural selection?

13. The evolutionary force that operates primarily through chance is

14. Unlike the situation today, the early atmosphere of the Earth probably contained very little

15. Experiments like those performed by Stanley Miller in 1953 demonstrated that

16. Which of the following is probably the best explanation for the fact that Antarctic penguins cannot fly, although there is evidence that millions of years ago their ancestors could do so?

17. In a certain flock of sheep, 4 percent of the population has black wool and 96 percent has white wool. Assume that the population is in Hardy-Weinberg equilibrium. What percentage of the population is homozygous for white wool?

18. Since the gene pool is an indication of all of the genes present within a given population, which of the following statements is accurate:

19. The persistence of the sickle-cell anemia allele in the African population is the result of

20. In evolution (and biology in general), a good rule is that the simplest explanation generally is best. The term for this is:

Questions 21-24 refer to the following directions.

The group of questions below consists of five lettered headings followed by a list of numbered phrases or sentences. For each numbered phrase or sentence select the one heading that is most closely related to it and fill in the corresponding bubble on your scantron sheet. Each heading may be used once, more than once, or not at all.

From the fields of study listed below, choose the field that has provided each of the following pieces of evidence that biological evolution has occurred.

a) comparative anatomy
b) comparative biochemistry
c) comparative embryology
d) geographical distribution
e) paleontology

Questions 25-26 refer to the following chart.

The following chart is a comparison of the amino acid differences in cytochrome C between Organism X and five other organisms.

Organism	# Amino Acid Differences
A	1
B	12
C	4
D	43
E	46

25. Based on the chart for cytochrome C amino acids, which organism is the most closely related to organism X?

26. Is it correct to infer that organisms D and E are closely related to each other?

Chi-Squared Problem

1. A student makes a monohybrid cross with *Drosophila(fruit flies)*. She crosses two heterozygotes for the white eye. Ww x Ww. She expects to see a 3:1 phenotypic ratio of Red eyes (WW and Ww) to white eyes (ww), her null hypothesis. She does the cross and observes the following numbers:

   White eyes= 170
   Red eyes= 830

Perform a chi square analysis on these results and find out if it is close enough to 3:1 to fail to reject her null hypothesis. **Make sure to show all work and explain your conclusions.**

$$\mathbf{X^2} = \frac{\sum (O-E)^2}{E}$$

E = number expected in each class
O = number observed in each class

Observed	Expected	O-E	$(O-E)^2$	$(O-E)^2/E$

Table of Chi-Square Values

df/P	.001	.01	.025	.05	.10
1	10.827	6.635	5.024	3.841	2.706
2	13.815	9.210	7.378	5.991	4.605
3	16.268	11.345	9.348	7.815	6.251
4	18.465	13.277	11.143	9.488	7.779

Hardy-Weinberg Problem

*Please put all work on the BACK of the scantron!

2. There are 100 students in a class. Ninety-six did well in the course whereas four blew it totally and received a grade of F. Sorry. In the highly unlikely event that these traits are genetic rather than environmental, then these traits involve dominant and recessive alleles. The four (4%) represent the frequency of the homozygous recessive condition, please calculate the following:

   A. The frequency of the recessive allele.
   B. The frequency of the dominant allele.
   C. The frequency of heterozygous individuals.