

Exam Key for Test 1.

Hi everyone. First off, great job! Wow, I don't recall ever seeing a mean this high on a exam in a class this large! Anyway, I didn't have enough time to address everyone's questions this morning regarding their grades. I had to run immediately to another class and probably didn't have enough time to properly evaluate specific cases. Some of you may still feel dissatisfied. If you still feel dissatisfied after reading this come and talk to me again. Try to catch me during a time that I'm not in such a hurry. I'm basically free Mondays, Wednesdays, and Fridays. My office is in BioPharm 322.

Thanks,

Frank

- 1.) Answer: Natural Selection is the only **evolutionary mechanism** that accounts for adaptation. Creationism isn't a mechanism or a process at all. It's a belief system.
- 2.) For each of these you needed to tell me which **assumption** of HW equilibrium was being violated by the particular evolutionary process.

Genetic drift: Answer- Infinite population size.

Comments: Some gave answers like population size is not infinite. That is what causes drift, but that is the opposite of the assumption being violated. The question asks for the assumption. This applies to the other processes. We didn't ask for any definitions of processes, we asked for the violated assumptions.

Assortative mating: Answer- individuals mate randomly.

Natural selection: Answer- there is no differences in survival or reproduction among individuals in the population.

Comments: Many lost a few points on this question. "changes" is different than "different". Survival and reproduction could "change" because of a change in the environment. But this wouldn't count as selection if it affected everyone in the same way. If it changes for everyone it isn't expected to violate this assumption. It may affect the size of the population, but that's not the assumption that's violated by Natural Selection. Also there isn't anything in the assumption about characters imparting fitness. A character imparting more fitness to some individuals is what violates the assumption. We wanted the actual assumption. Again, I think people fell into the trap of defining the process instead of identifying the violated assumption.

Migration: Answer- no introduction of new genetic material. (No major problems here).

- 3.) a.) 48 individuals expected to be heterozygous.
- b.) Inbreeding. Remember, this process will always lead to loss of heterozygotes.

c.) Polymorphic. Remember, inbreeding decreases the number of heterozygotes, but doesn't affect allele frequencies. If you got part b. wrong, you were ineligible for the bonus (in most cases).

I accepted some other answers if a good argument was be made. I can't think of any good argument for Genetic Drift though. Genetic drift is expected to lead to loss of allelic diversity. This example doesn't fit.

4.) Answer: b.

Comments: if you want to produce a cow that produces more milk, you want to mate males and females that carry genes for producing more milk.

5.) "genetic drift" (few problems here)

6.) small populations. (few problems here)

7.) Pattern. There were only two options, process or pattern. The point of this question was to make sure you remember that microevolutionary studies focus on process and macroevolutionary studies focus on patterns.

8.) Venezuela has the smallest effective population size (N_e), therefore it will lose diversity faster.

9.) answer- No

in order for this to represent evolutionary migration, individuals from this population would have to move to a new population and breed. These individuals are moving around, but it is all the same population.

10.) a. Migration rate is equal to #of migrants/total population size. In this case 10/50.

b. 32 (I don't think anyone missed this. As long as you filled the formula out right I gave you credit.

c. $2N_e(m) > 1$ in this case, so the populations will remain the same. Any graph that represented this was acceptable.

11.) Anyone of these is acceptable:

- 1.) even sex ration
- 2.) constant population size
- 3.) non-overlapping generations.

If you put one of these down but put another down that was wrong you lost points. You can't circle two answers on a multiple choice exam and this is no different!

12.) Answer: Evolution by natural selection requires that there be a genetic component to the trait being selected. Although it was established that size and leg length were being selected, it wasn't established that there was a genetic component to these traits.

People lost points for claiming that there wasn't a genetic component, or that these were environmentally induced changes. We can't tell from this research what the source of the variation is. Also, people lost points if they said that there wasn't enough time for evolution to occur. Genetic composition changes within a generation when natural selection is operating (think about our discussion in class, P doesn't equal P'.

13.) Any diagram showing one difference was acceptable. I would of compared Darwin's tree which shows common ancestry to Lamarck which shows no common ancestry.