

BILD 3 SAMPLE FINAL EXAM

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Instructions.

This sample final is intended to give you an idea of questions that may be asked on the exam. It is in **no way** a complete sampling of the topics that will be covered in the exam. My suggestion to you is to study before taking this practice exam to figure out what areas you may need to study more in. No answer key will be provided for this exam, however, you may email me or visit my office hours to discuss your answers. I **will not** provide any answers without proof that you have attempted the question beforehand. Good luck!

Section I. Multiple Choice

1. Scientists found the fossilized remains of a canine's jaw and leg. What information must first be obtained before the scientists can place the fossils in the ancestral time line of the dog?

- a) The age of the fossils
- b) The continent where the fossils were found
- c) The rest of the skeleton
- d) The population trends for the species

2. Match each of the following evolutionary thinkers with their corresponding theories on evolution:

- 1. Linnaeus
 - 2. Cuvier
 - 3. Lamarck
 - 4. Malthus
 - 5. Hutton and Lyell
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- a. inheritance of acquired traits
 - b. predicted widespread famine
 - c. gradualism and uniformitarianism
 - d. classified organisms into hierarchical categories
 - e. catastrophism and extinction

3. Which of the following are vestigial organs?

- a. goosebumps
- b. thumb
- c. wisdom teeth
- d. all the above

- e. both a and c
- f. both b and c

4. Which of the following statements is true?

- a. Fitness is the contribution a population makes to the gene pool of the next generation.
- b. A mutation is one of the many sources of genetic variation.
- c. White and blue forms of snow geese are examples of different genotypes
- d. Sexual recombination creates genetic variation.

5. Which of the following is NOT a condition that must be met for a population to be in Hardy-Weinberg Equilibrium?

- a. Migration in and out of population
- b. No mutations
- c. Large population size
- d. Random mating
- e. None of the above

6. When an organism produces a large amount of offspring at one time and then dies, it can be called:

- a. synchronous reproduction
- b. semelparity
- c. iteroparity
- d. none of the above

7. If a colony of bacteria are exposed to a new culture, how will that population grow?

- a. the population will grow exponentially and unabated
- b. the population will not grow
- c. the population will grow exponentially at first, and then logistically as the population reaches its carrying capacity
- d. none of the above

8. A species has high reproductive rate in a stable environment, with little competition for resources, which of the following is true?

- a. Population density is sensitive to K-selection
- b. Population density is sensitive to r-selection
- c. Population density is sensitive to N-selection
- d. The population is at carrying capacity

9. Match the following words with their correct definitions

- Mullerian mimicry _____
Batesian mimicry _____

Mutualism _____
Keystone Species _____
Autotrophs _____
Facilitation _____

- a. Exert strong control on a community by their ecological roles, or niches
 - b. (primary producers) create organic molecules (nutrition) from energy from sun
 - c. Early arriving species may facilitate the appearance of later species by making the environment more favorable
 - d. Two or more unpalatable species resemble each other
 - e. palatable or harmless species mimics an unpalatable or harmful model
 - f. interspecific interactions that benefits both species (+/+) such as in the case of the ant and the acacia tree
10. The Competitive Exclusion Principle states that:
- a) two species competing for different resources cannot coexist in the same place
 - b) two species competing for the same limiting resources cannot coexist in the same place
 - c) two species can coexist in a community if their niches are identical
 - d) two species cannot coexist in a community if their niches are different
11. Cryptic and aposematic coloration are which kind of interspecific interaction?
- a) mutualism
 - b) herbivory
 - c) predation
 - d) competition
 - e) commensalism
12. Which of the following is NOT true about protection of biodiversity hot spots?
- a) Protection is difficult because these areas are difficult to identify
 - b) Conservation is difficult because many hot spots are specific to only a few taxonomic groups
 - c) All of the world s conservation efforts should be focused on these areas
 - d) It is often biased against microorganisms
 - e) Protection is important because hot spots only occupy 1.5% of the Earth but are home to a majority of all species on Earth.
13. What is believed to be the cause of the anoxia (and therefore dead zone) where the Mississippi River flows into the Gulf of Mexico?
- a. Biological magnification of DDT used to control malaria along the Mississippi
 - b. An overabundance of photochemical smog from New Orleans
 - c. The death of microbes, no longer able to fix N for fish and other organisms
 - d. Acid precipitation from ore smelters of mines along the Mississippi

- e. Nutrient-enriched runoff from farms along the Mississippi
14. Assuming that the human carrying capacity is limited by food production abilities rather than food distribution efficiency what should we do to maximize our carrying capacity (K)?
- Eat organic foods
 - Use fewer pesticides
 - Eat primary producers exclusively
 - Fertilize the oceans with phosphorous
 - Revert to pre-agricultural-revolution farming techniques
 - All of the above
15. What of the following is not an anthropogenic effect?
- Nitrogen from farm fertilizers run off into local streams and cause a bloom in phytoplankton
 - Industrial smoke stacks releasing pollution that causes acid rain in the local area
 - Lightning during a storm causes a wildfire which burns away all local vegetation
 - Increased CO₂ released from human industry causes glaciers to melt
 - All of the above are anthropogenic effects
16. This is known as the Age of Mammals
- Paleozoic
 - Mesozoic
 - Cenozoic
 - Neozoic
17. According to the endosymbiont theory,
- The infolding of the plasma membrane of primitive cells formed vesicles and cytoplasmic organelles that have evolved specialized functions
 - Mitochondria and chloroplast were formerly small prokaryotes that were incorporated into and evolved symbiosis inside larger cells
 - A cell's inner membrane originated from the infoldings and specialization of the plasma membrane
 - Phagocytosis accounts for the origin of the inner membrane in prokaryotes
 - The small genomes in chloroplast and mitochondria were derived from segments of DNA from their host eukaryotic nucleus
18. As discussed in lecture, which of the following is a possible hypothesis of the origin of life on Earth?
- Organic molecules came from outer space.
 - Organic molecules were synthesized in the Earth's atmosphere with the help of lightning.
 - Organic molecules were synthesized in deep sea thermal vents.
 - Two of the above answers: _____ and _____.

e. All of the above are true.

19. Most energy gained by consumers in the biomass pyramid is lost as:

- a. detritus
- b. heat
- c. cellular respiration
- d. autotrophs
- e. all energy is conserved

20. A population of giraffes have varying neck lengths that average at 22 feet. A hurricane wipes out much of the giraffe population, selecting against some neck lengths. However, in the new population, the average neck length remains the same. This CAN be a reflection of:

- I. Stabilizing Selection
- II. Disruptive Selection
- III. Directional Selection

- a. II & III
- b. I & II
- c. I & III

Section II. Fill in the blank

The emergence of numerous species of finches that descended from a common ancestor on the many diverse islands of the Galapagos is an example of _____.

Consider the goldenrod ball gall fly, a species that varies in size. Wasps only parasitize smaller galls and birds predate only on the larger galls. Each predatory organism creates a _____ selection that when combined within that same environment creates _____ selection on gall size.

An allele is _____ when it is found in 100% of the time in a population.

The phenomenon that occurred on the island of Pingelap generations after a typhoon killed most of its population where an unusually high proportion of its inhabitants exhibit symptoms of the rare disorder called Achromatopsia is an example of _____.

_____ is a key factor in determining population trends in a population not experiencing immigration/emigration.

Clements' integrated hypothesis differs from Gleason's individualistic hypothesis in a few ways. One difference is that Clements believes that species in a community are linked together by _____ interactions while Gleason believes that species in a community

are linked by the same _____ requirements.

_____ is the most common limiting nutrient in freshwater ecosystems

If removing an organism from a community results in a drastic drop in the # of species present in the community over the years, then this organism is known as _____

Section III. Short Response

1. You have a taxonomist friend who thinks that some birds you and she have been describing are really two species, based on the fact that some of the male birds have red patches on their throats and some do not. You, however, think that they are all the same species, because their phenotypes are otherwise so similar and because they live in the same geographic area.

a) What definition of a species are you and your friend arguing about, and why?

b) If all of the birds were phenotypically similar, is it possible that they could be more than one species? If so, what kind of species would they be?

2. Briefly define.

a. Adaptive radiation

b. Prezygotic isolating mechanism

c. Gene pool

d. Allopatric speciation

e. Greenhouse gas

f. Founder effect

3. Small population size is a concern to conservationists for a number of reasons. Small populations may head down what is called the extinction vortex which implies that the negative effects of small populations get compounded leading to even smaller population sizes until extinction. How does this work?

4. Populations of the Hoekstramouse have variation in coat color with light colored mice and dark colored mice segregating in a population. Suppose coat color is controlled by a single gene and light (d) is recessive to dark (D). A population is in Hardy-Weinberg equilibrium and 49% of mice are white. What is the frequency of the dark allele in this population?

5. Now suppose Hoekstramice recently invaded an island with white sand dunes as the major habitat. This island has mice genotypes in the following proportions. The founding population has the same allele frequencies as the population in problem 44. After one generation adults have the genotype frequencies:

10. In Oakland, individuals of the population can exhibit the trait of being hella hard, or not hard at all. Being hella hard is characterized as being a dominant trait over being not hard (the recessive) and is denoted by G. If the population is in Hardy-Weinberg Equilibrium, and given the allele frequency of G is 0.8 (many are hella hard in Oakland), how many individuals in the population would exhibit the phenotype of being hella hard, assuming the population of Oakland is 100 individuals?

11. Draw the Type I, II, and III survivorship curves on a single set of axes. Make sure to label your axes.

b) Provide an example of a Type III species.

c) Is a Type III species more likely to be semelparous or iteroparous?

12. You are being chased by zombies who are trying to eat your brain filled with BILD 3 knowledge.

a. What type of interspecific interaction is this?

b. Are the zombies heterotrophs or autotrophs?

c. It turns out aliens enjoy dining on zombies and prey upon them. A large population of aliens orbiting the Earth accidentally blows up due to a collision to some space debris. Over time, the population of humans also decreases. What model of community organization is probably controlling population size?

13. What would be the effect of global warming on the Sierra snowpack and California's water supply if CO₂ levels continue to rise?

14. Eutrophication is an increase in productivity as a result of an increase in nutrients. Why is eutrophication a problem in an aquatic ecosystem?

15. The African Okapi is most closely related to the giraffe, having similar body structure and skull structure, though the legs of the okapi have black and white stripes similar to the zebra. Explain, using correct terminology, the evolutionary advantage of this coloration and how such a similar coloration could have emerged from two different species.