

N= 12 @ 0900h
15 @ 0905

KEY

YOUR NAME: _____
Environmental Biology 206 EXAM II 07 March 2007 (exam worth 100 points)

Multiple Choice (questions have only one correct answer; 12 points total; 2 points each)

- Why is the Brown Tree Snake a problem in Guam?
 - eats naïve native animals
 - has no predators
 - causes electrical blackouts
 - all of the above
 - none of the above
- As discussed in this class, what evolves?
 - DNA,
 - individual animals and plants,
 - populations,
 - ecosystems,
 - none of the above
- Which of the following traits demonstrates an example of stabilizing selection?
 - human birth weight
 - bill depth on Daphne Major in the Galapagos
 - lizard perch height in the Caribbean
 - number of bristles on fruit flies in the laboratory
 - none of the above
- Which best describes the modern evolutionary synthesis?
 - The combination of paleontology and the mechanisms proposed by Darwin and Mendel
 - Wegener's study of plate tectonics
 - Darwin's publication of the *Origin of Species*
 - Watson and Crick's discovery of DNA in the 1950s
 - All of the above
- Which is the biggest threat to biodiversity?
 - invasive species
 - disease
 - pollution
 - over-hunting
 - habitat loss
- In a typical bibliographic citation for a scientific article, which of the following is listed first?
 - author
 - year of publication
 - article title
 - page numbers of article in journal
 - publication journal

Really Short Answer (a few words or a sentence; 33 points total; 3 points each)

- List three things that have been shown to reduce the number of offspring that a woman has during her lifetime.
more ♀ education, age of first reproduction, ↓ infant mortality (see slide 13 lecture 22)
- Succinctly differentiate between environmental biology and ecology.
add something about human role study of distribution + abundance of organisms
- List the three most common plants found at the bottom of Tumamoc Hill.
creosote + (prickly pear, mesquite, palo verde, brittle bush, triangle leaf bursage)
- What geographic feature is a major dividing line between populations of desert tortoises.
Colorado River

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5. Show how you would convert 25 degrees Celsius to Fahrenheit.

$$\frac{9}{5}(25C) + 32 = \times F \qquad 25C = (\times F - 32) \frac{5}{9}$$

6. If elephants are considered K-selected, what was Darwin's point in discussing the reproduction of elephants over 500 years?

Even the slowest breeders have capability for exponential growth and increasing population above carrying capacity (hence his invocation of natural selection)

7. Define Ernst Mayr's biological species concept.

A group of interbreeding populations that are reproductively isolated from other such groups.

8. What three criteria must be met for evolution by natural selection to occur?

Variable trait, heritable trait, trait affects fitness

9. Do oceanic islands better represent primary or secondary succession? Why?

1° b/c arise either as volcanic rock (or coral reefs) w/ no terrestrial flora or fauna

10. Why are there so many mammals that only recently went extinct in western North America?

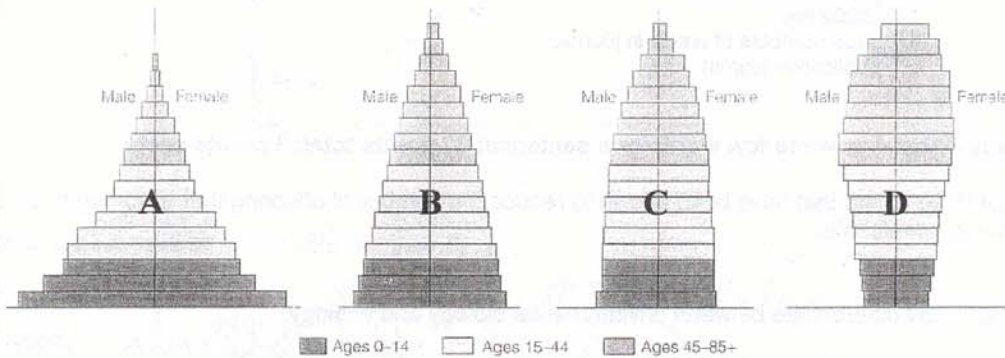
Humans came to N. America from Asia ~15,000 yrs ago. About 11,000 yrs ago Clovis points + other technology allowed for overhunting.

11. Calculate the doubling time of a population that is growing at 5% per year. Please show your work.

$$\frac{70}{5} = \underline{14 \text{ yrs}}$$

Using the diagram below, answer the following questions (2.5 points each, 10 points total):

- Which diagram (A, B, C, or D) represents the lowest positive population growth rate? *C*
- Which diagram best represents a developing country like Guatemala? *A*
- Which diagram likely has the highest infant mortality? *A*



4. What is important about the ages 15-44 (noted in the lightest color in the figures above)?

Age of reproduction; when more individuals will be added to the population.

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Short Answer (45.5 pts total; 6.5 pts each; a few complete sentences required)

12. In a developing country, how is a biosphere reserve a conservation strategy that might be more successful than a national park.

by having core buffer + transition a biosphere reserve attempts to protect habitat while also acknowledging human use and presence

A national park that is just set aside is often not a feasible model in poorer areas.

13. Explain, using genetic and ecological concepts, why it might NOT be a good idea to move desert tortoises from one part of the species' range to another part of the species' range?

OR

- B Give an example (real or imaginary) that explains the founder effect, genetic drift, and speciation.

A) Different alleles in the different populations that may confer some relative advantage in that area where those alleles naturally occur

B) founder effect - starting new population w/ only a few individuals + ∴ only a subset of the genetic variation
genetic drift - in small, isolated population the allele frequencies will Δ by chance
speciation - when isolated long enough the genetic Δs will lead to new species

14. Choose two species in the Galapagos Islands and explain how the El Niño weather phenomenon affects them.

Marine Iguanas - during el niño years lack of cold, nutrient rich water means algae + other marine foods are less plentiful so big animals starve, other animals shrink, and small body size is selected for

Finches - during el niño years the foods (size + hardness of seeds) changes leading to selection for slightly altered bill sizes in the finches

15. Based on your chapter by Quammen, why do aphids switch between sexual and asexual reproduction? What is it about each of these reproductive strategies that confers some benefits at least some of the time?

Asexual - allows for extremely rapid population growth in suitable environmental conditions

Sexual - allows for genetic recombination facilitating variation in the population and ∴ the ability of the population to respond to changing environmental conditions

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16. Explain how the concept of biodiversity includes many scales. How did Taylor Edwards define Conservation Biology?
 OR ^{protect + maintain biodiversity}
 Differentiate between instrumental and intrinsic values of biodiversity. Please provide an appropriate example for both kinds of valuation.

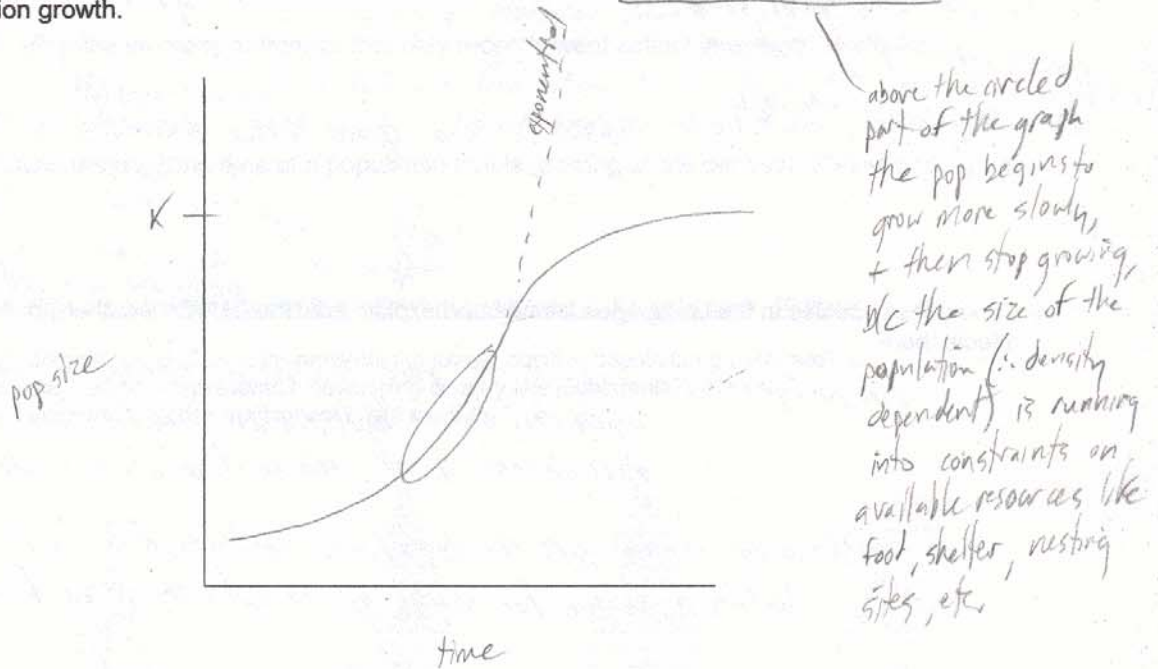
Need an example for each

genetic, species, community, structural, biome, ecosystem
 some benefit to humans (food, building materials, medicine, scientific knowledge, aesthetic beauty, spirituality, ecosystem services like clean water)

intrinsic - biodiversity has own inherent worth + value whether we ascribe value to it or not, humans totally irrelevant

17 and 18.

- Draw a graph of logistic growth on the axes below. Be sure to label your axes. Using your graph and accompanying text, explain the three concepts of r , K , and density-dependent limitations on population growth.



r = intrinsic rate of pop growth with unlimited resources; allows for the rapid rate of pop. growth seen in the circled part of the graph

K = carrying capacity: a theoretical limit on the number of individuals that can be sustained given the resources available

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