DEC-2014

1. The population density of an insect species increases from 40 to 46 in one month. If the birth rate during that period is 0.4. What is the death rate?
    a. 0.25
    b. 0.15
    c. 0.87
    d. 0.40

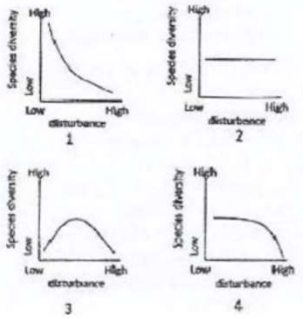
2. Which species concept utilizes morphological and molecular characters to distinguish between species?
    a. Evolutionary
    b. Ecological
    c. Biological
    d. Phylogenetic

3. Worker bees, instead of themselves reproducing, help the queen reproduce. This behavior is explained as an example of
    a. kin selection
    b. group selection
    c. sexual selection
    d. natural selection

4. The wings of insects and the wings of bats represent a case of
    a. divergent evolution
    b. convergent evolution
    c. parallel evolution.
    d. neutral evolution

5. The possible relationships between levels of disturbance and species diversity in a biological community are that species diversity
    a. is unaffected by disturbance.
    b. is highest at intermediate levels of disturbance.
    c. decreases exponentially with increasing levels of disturbance.
    d. starts decreasing only at higher levels of disturbance.

6. Match each graph with its corresponding statements above:



    a. 1-D, 2-C, 3-B, 4-D
    b. 1-C, 2-D, 3-B, 4-A

c. 1-A, 2-B, 3-C, 4-D
d. 1-C, 2-A, 3-B, 4-D

7. in a random sample of 400 individuals from a population with allele of trait in Hardy-Weinberg equilibrium, 36 individuals are homozygous for allele a. How many individuals in the sample are expected to carry at least one allele A?
   a. 36
   b. 168
   c. 364
   d. 196

8. Which of the following statements is NOT correct regarding effect of genetic drift?
   a. It alters allele frequency substantially only in small population.
   b. It can cause allele frequencies to change at random.
   c. It can lead to a loss of genetic variation within populations.
   d. It can cause harmful alleles to become eliminated.

9. Individual A performs to another individual a behavioral act which has a fitness consequence. Match the behavioral acts (a to e) with the correct fitness consequence (i) to (iv)

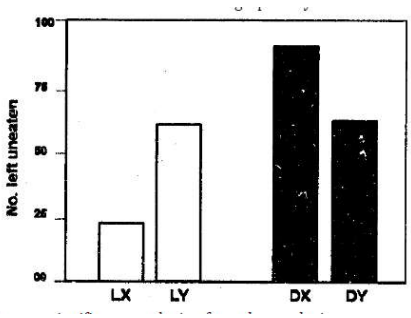
Behavioral act	Fitness consequence to A
Cooperation (a)	Gains direct fitness but after delay (i)
Adaptive altruism (b)	Loses inclusive fitness (ii)
Spite (c)	Gain indirect fitness (iii)
Deceit and manipulation (d)	Gains direct fitness but immediately (iv)
Reciprocity (e)	

   a. a-(iv),; b-(iii); c(ii); d-(ii); e-(i)
   b. a-(i); b(ii); c(ii); d(iii); e(iv)
   c. a-(i); b(iii); c(ii); d(ii); e(iv)
   d. a-(i); b(ii); c(iii); d(i); e(iv)

JUN-2014

1. In. very small populations, genetic variation is often lost through genetic drift. If the population size of a mammal on an isolated island is 50, what percentage of its genetic variation is lost every generation
   a. 0.01
   b. 0.5
   c. 0.1
   d. 0.05

2. Fish species X and Y feed on mayfly nymphs in their stream habitat. In a laboratory experiment, the predation intensity of X and Y on their prey was tested under dark (D) and light (L) conditions. Thus, the experimental protocol included four aquaria LX, LY, DX and DY. In each aquarium containing 100 mayfly nymphs, one fish was introduced and allowed to feed for 30 minutes. Then the fish was removed and the number of mayfly nymphs left uneaten in each aquarium was counted. The results are shown graphically below The most significant conclusion from the results is:



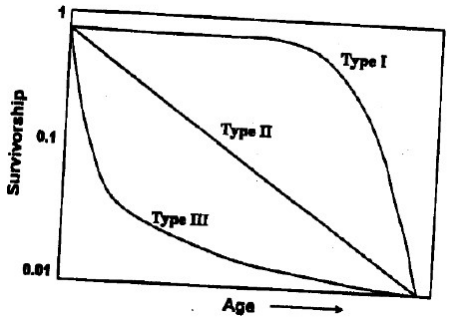
a. X is a visual predator, but has less predation impact on theÂ prey than Y.
b. X is a visual predator and has greater predation impact onthe prey than Y.
c. Y is a visual predator and has greater predation impact on,the prey than X.
d. Y is a visual predator but has less predation impact on theprey than X.

3. There are three species of frogs - A, B and C. Species A does not provide parental care for its eggs and larvae. Species B is subjected to predation by a predator that selectively feeds only on small-sized larvae. Species C faces progressively decreasing opportunities for breeding with increasing age. Assuming that resources available for reproduction are similar for A, B and C. Which of the following strategies would have been favored?
    a. A should produce a large number of small-sized offspring; B should produce a small number of large-sized offsprings; C should breed earlier in life.
    b. Species A and B should produce a small number of large sized offspring and C should breed earlier in life.
    c. Both species A and B should produce a large number of small-sized offspring and C should breed later in life but increase its clutch size.
    d. Species A should produce a small number of large-sized offspring; B should 'produce a large number of small sized offspring and C should breed earlier in life with a small clutch size.

4. Which of the following set of observations is true with reference to a comparison of aquatic (A) and terrestrial (T) ecosystems?
    a. Number of trophic levels is more in A than T. Productivity/Biomass ratio is higher in T than in A. Herbivore assimilation efficiency is higher in A than in T.
    b. Number of trophic levels is more in T than in A. Productivity/Biomass ratio is greater in A than in T. Herbivore assimilation efficiency is higher in T than in A.
    c. Number of trophic levels is more in T than in A. Productivity/Biomass ratio is higher in T than in A. Herbivore assimilation efficiency is higher in T than in A.
    d. Number of trophic levels is more in A than in T. Productivity/Biomass ratio is greater in A than in T. Herbivore assimilation efficiency is higher in A than in T.

5. A small lake has three trophic levels- phytoplankton (autotrophs), Zooplankton (herbivore) and planktivorous fish (primary carnivore). Into this lake, a population of piscivorous fish (secondary carnivore) was introduced to study the 'topdown' effects". What is the expected long-term consequence of such an introduction to phytoplankton and zooplankton trophic levels?
    a. Zooplankton biomass will increase and phytoplankton biomass will decrease.
    b. Zooplankton biomass will decrease and phytoplankton biomass will increase.
    c. The biomasses of both zooplankton and phytoplankton will increase.
    d. The biomasses of both zooplankton and phytoplankton will decrease.

6. Following is the diagram of three idealized survivorship curves of animals. Find the correct match between the group of animals and the respective survivorship curves.



   a. Marine pelagic fish and large mammals -III and I, respectively.
   b. Marine pelagic fish and large mammals - I and II, respectively.
   c. Some birds and large mammals - I and III, respectively.
   d. Marine pelagic fish and some birds “I and III, respectively.

7. A few events in the history of life on earth are given below.
   A. Radiation of mammals and bird; Flourishing of insects and angiosperms
   B. Primitive plants and fungi colonize land, Diversification of echinoderms.
   C. Seed plants appear; Fishes and Trilobites abundant; earliest amphibians and insects.
   D. Earliest birds and Angiosperms appear; Gymnosperms dominant.
   E. Invasion of land by primitive land plants and Arthropods
   F. Mass marine extinctions: Reptiles radiate; Amphibians decline.
   Which of the following is a correct match of the above events with the geological period during which they occurred?
   a. A: Ordovician; B: Tertiary; C: Permian; D: Silurian E: Devonian; F: Jurassic
   b. A: Permian; B: Devonian; C: Silurian; D: Ordovician; E: Tertiary; F: Jurassic
   c. A: Tertiary; B: Ordovician; C: Devonian; D: Jurassic; E: Silurian; F: Permian
   d. A: Permian; B: Devonian; C: Jurassic; D: Tertiary; E: Silurian; F: Ordovician

8. Four different species concepts are given below:
   a. Species separate based on their use of different ecological niches and their presence in different habitats and environments.
   b. Differences in physical characteristics or molecular characteristics are used to distinguish species.
   c. Species are distinct if they are reproductively isolated.
   d. Phylogenetic trees and analyses of ancestry serve to differentiate species.

9. Which of the following gives the correct names of the above concepts?
   a. A: Biological; B: Phylogenetic; C: Evolutionary; D: Ecological
   b. A: Ecological; B: Phylogenetic; C: Biological; D: Evolutionary
   c. A: Evolutionary; B: Ecological; C: Biological; D: Phylogenetic
   d. A: Phylogenetic; B: Evolutionary; C: Ecological; D: Biological

10. Three Indian animals -cormorant, lion-tailed macaque and gerbil are to be matched with the ecosystem they inhabit - Wetland (A), Desert (B), Deciduous Forest (C), or Rain' forest (D). Which of the following is the correct match of each animal with its habitat?
    a. Cormorant - D; Lion-tailed macaque - C; Gerbil - B
    b. Cormorant - A; Lion-tailed macaque - C; Gerbil - D
    c. Cormorant - A; Lion-tailed macaque - D; Gerbil - B

d. Cormorant - B; Lion-tailed macaque - C; Gerbil- D

11. Given below are some of the methods used to assess evolutionary phylogenetic relationships among plant taxa.
    a. 16S rRNA sequence
    b. Mitochondrial microsatellite
    c. Biochemical characterization
    d. Morphology

12. Which two of the above methods can best reveal evolutionary phylogenetic relationships?
    a. A and B
    b. B and C
    c. C and D
    d. A and D