PASS MOCK EXAM – FOR PRACTICE ONLY

Course: BIOL 1104 Facilitator: Yulia Maistrovski
Dates and locations of mock exam take-up: Tue, April 12th: ME-4494

IMPORTANT:

It is **most beneficial** to you to write this mock midterm **UNDER EXAM CONDITIONS**. This means:

- Complete the midterm in 3 hour(s).
- Work on your own.
- Keep your notes and textbook closed.
- Attempt every question.

After the time limit, go back over your work with a different colour or on a separate piece of paper and try to do the questions you are unsure of. Record your ideas in the margins to remind yourself of what you were thinking when you take it up at PASS.

The purpose of this mock exam is to give you practice answering questions in a timed setting and to help you to gauge which aspects of the course content you know well and which are in need of further development and review. Use this mock exam as a *learning tool* in preparing for the actual exam.

Please note:

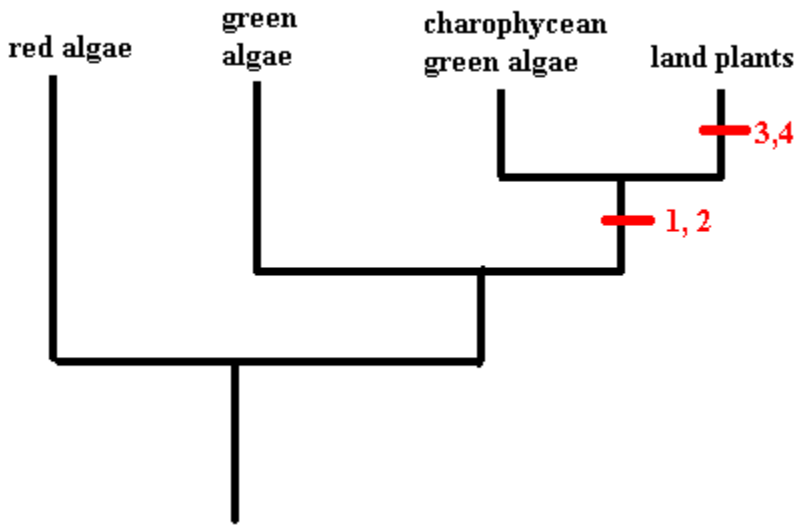
- Come to the PASS session with your mock exam complete. There, you can work with other students to review your work.

- Often, there is not enough time to review the entire exam in the PASS session. Decide which questions you most want to review – the facilitator may ask students to vote on which questions they want to discuss.

- Facilitators do not bring copies of the mock exam to the session. Please print out and complete the exam before you attend.

- Facilitators do not produce or distribute an answer key for mock exams. Facilitators help students to work together to compare and assess the answers they have. If you are not able to attend the PASS session, you can work alone or with others in the class.

GOOD LUCK!



1) In the above phylogeny, what would be appropriate designations for traits 1-4?
A) 1 - phragmoplasts, 2 - multicellular, dependent embryos, 3 – alternation of generations, 4 – waxy cuticle.
B) 1 – sporopollenin, 2 – similar cellulose-synthesizing complexes, 3 – walled spores produced in sporangia, 4 – alternation of generations
C) 1 – waxy cuticle, 2 – alternation of generations, 3 – apical meristems, 4 – multicellular, dependent embryos
D) 1 – photosynthesis, 2 – internal water transport, 3 – phragmoplasts, 4 – waxy cuticle
E) 1 – plastids, 2 – photosynthesis, 3 – internal water transport, 4 – similar cellulose-synthesizing complexes

2) What is a defining difference between the life cycles of mosses (Bryophytes) and ferns (Pterophytes)?
A) Mosses do not produce spores
B) The gametophyte generation does not exist in ferns
C) In mosses, the gametophyte is dominant
D) In ferns, the gametophyte is diploid
E) In mosses, the gametophyte does not produce sperm

3) Which of the following is **not** true concerning the sporophyte or gametophyte generations of Angiosperms?
A) The flower is composed of gametophyte tissue only
B) The sporophyte generation is dominant
C) The sporophyte generation is what we see when looking at the plant
D) The gametophyte generation is not photosynthetic
E) The gametophyte generation consists of relatively few cells within the flower

4) You are trying to determine the importance of novel traits to insect diversity. You find that in one group of beetles, extensive adaptive radiation occurred following the acquisition of the ability to digest lignin. You should…..
A) Conclude that the ability to digest lignin must be a pleisomorphy defining all beetles a group.
B) Conclude that the ability to digest lignin must be a key innovation.
C) Conclude that the ability to digest lignin conveys an evolutionary disadvantage.
D) Test to see whether the ability to digest lignin has caused adaptive radiation in any other groups of insects.
E) Test to see whether the ability to digest lignin is lost in any members of the group.

5) Which of the following mechanisms is thought to be primarily responsible for the diversification of insect herbivores?
A) Convergent evolution
B) Coevolution
C) Sexual selection
D) Evolution of homologous traits in many phylogenetically independent groups
E) Punctuated equilibrium

6) According to most current phylogenies, fungi are most closely related to:
A) Vascular plants
B) Euglenozoans
C) Animals
D) Non-vascular plants
E) Bacteria

7) Which of the following is **not** a characteristic of hyphate fungi?
A) They acquire their nutrients by absorption.
B) Their body plan is a netlike mass of filaments called a mycelium.
C) Their cell walls consist mainly of cellulose microfibrils.
D) They may be saprobes, parasites, or mutualistic symbionts.
E) They engage in sexual and/or asexual reproduction.

8) Lichens result from:
A) A commensalism between a protist and a bacteria.
B) A commensalism between a vascular plant and a fungus.
C) A mutualism between a land plant and a fungus.
D) A mutualism between a green alga and a fungus.
E) A protist parasitizing a plant.

9) A squirrel drowns in a pond in your back yard. Based on what you know about the characteristics of fungi, which of the following groups of organisms will likely be responsible for the decomposition of the squirrel's hair?
A) Zygomycetes
B) Ascomycetes
C) Glomeromycetes
D) Chytrids
E) Basidiomycetes

10) *Claviceps purpurea* is associated with…
A) coffee rust.
B) blue cheese.
C) yeast infections.
D) amphibian population declines.
E) ergotism.

11) Which of the following is not a common characteristic of animals?
A) Metamorphosis
B) Flagellated sperm
C) Autotrophy
D) Nerve cells
E) Larvae

12) What is the main change in the phylogeny of Metazoans when it is based on molecular data rather than morphology?
A) Lineages are no longer well-organized by the presence of 'true' tissues.
B) Lineages become better grouped by presence or absence of a coelom.
C) Lineages are no longer well-organized by their axis of symmetry.
D) Lineages of organisms with bilateral symmetry are organized differently.
E) New groupings do not contain any commonalities in terms of morphology.

13) Which of the following pairs is mismatched?
A) Porifera – nerve net
B) Cnidaria – two germ layers
C) Platyhelminthes – cerebral ganglia
D) Ecdysozoans – molting
E) Arthropods – jointed legs

14) 'Darwin's Paradox' is concerned with:
A) Some Gastropods lacking shells despite the presence of a mantle.
B) Coral reefs having high levels of biological diversity despite low nutrient levels in ocean water.
C) The disagreement of several phylogenies based on different kinds of morphological characters.

D) The inability of natural selection to explain the complexity of Cephalopod eyes.
E) The incredible diversity of Coleopteran insects.

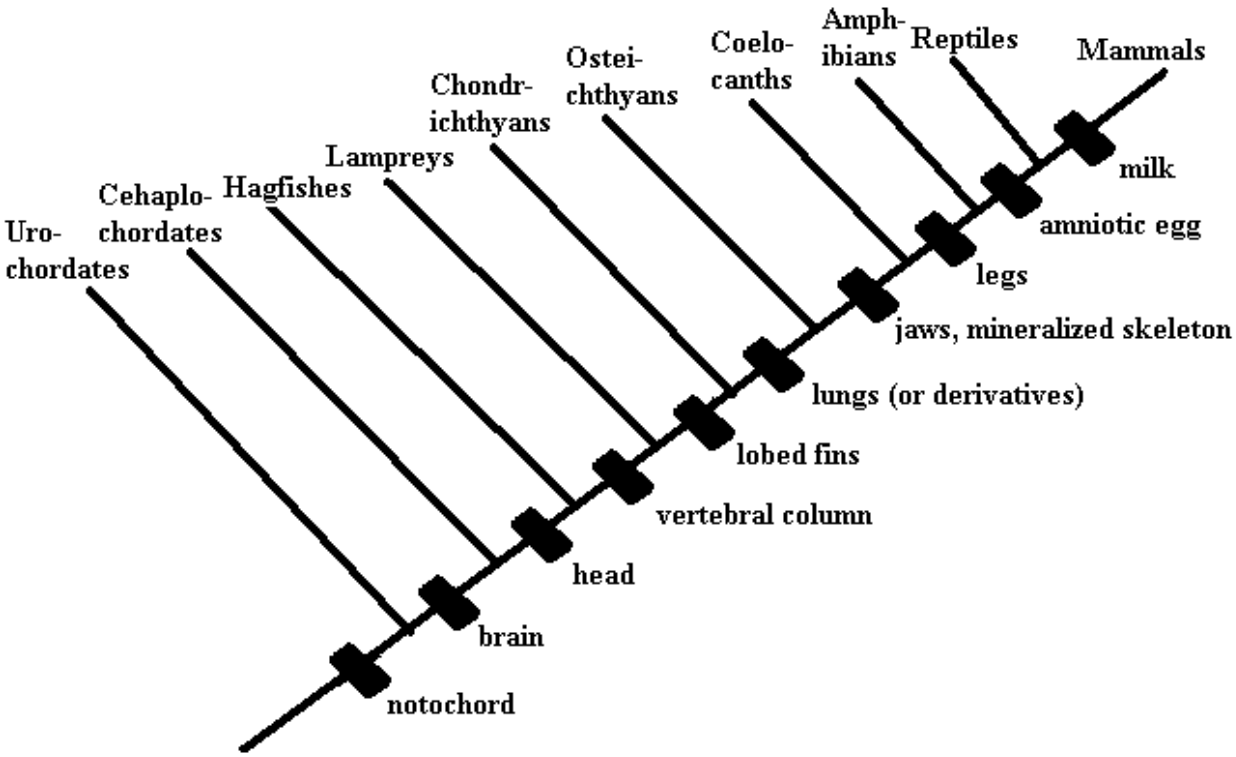
15) Which of the following groups of organisms does not have any members with structures composed of chitin?
A) Arthropods
B) Protists
C) Fungi
D) Cephalopods
E) A and D

16) Which of the following is true regarding flight and/or herbivory in insects?
A) Insect herbivory is homologous to mammal herbivory.
B) Insect flight is homologous to bird flight.
C) Flight and herbivory are synapomorphies defining insects as a group.
D) Flight evolved once in the insects, whereas herbivory arose several times.
E) All insects are capable of flight whereas only some are herbivores.

17) The synapomorphy identifying craniates as a group is…
A) Dorsal, hollow nerve cord
B) Anapsid skulls
C) Pharyngeal slits
D) Egg with an allantois
E) Migrating neural crest cells

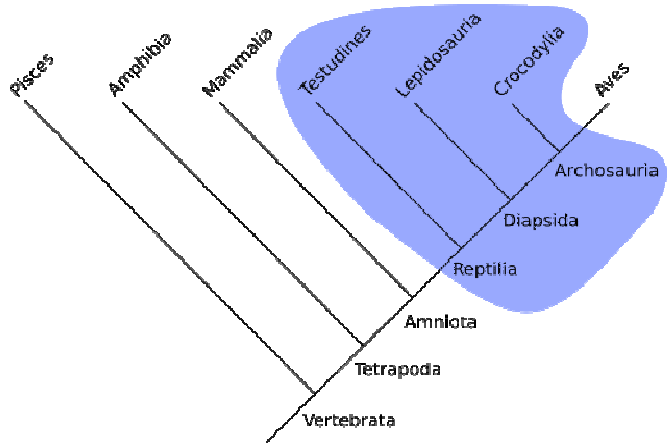
18) Which of the following is not a characteristic of the living synapsids?
A) Hair
B) Milk
C) Endothermy
D) Anterior and posterior air sacs
E) Middle ear bones

19) According to the phylogenies shown in lecture, birds are:
A) Synapsids
B) Diapsids
C) Dinosaurs
D) Reptiles
E) B, C and D



20) Although the taxa in the above phylogeny are correctly placed, two of the evolutionary innovations are in the wrong positions. Which two need to be switched to correct the sequence of evolutionary events?

A) head <-> brain
B) jaws, mineralized skeleton <-> vertebral column
C) lobed fins <-> jaws, mineralized skeleton
D) lungs (or derivatives) <-> legs
E) amniotic egg <-> lungs (or derivatives)



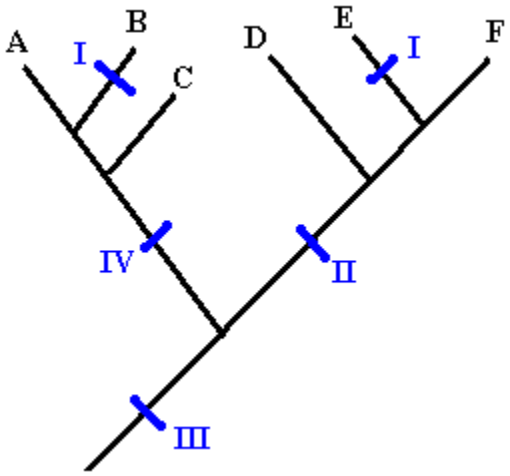
21) The grouping (blue) in the tree above is….

A) monophyletic.

B) a clade.
C) not a clade.
D) analogous.
E) a node.

22) Which of the following was ***not*** associated with the Cambrian explosion?
A) The appearance of Eukaryotes
B) An increase in oxygen levels in the atmosphere
C) The appearance of many predacious organisms
D) The appearance of organisms with shells, eyes, and claws
E) Evolutionary changes in HOX genes

23) The four-chambered hearts of birds and the four-chambered hearts of mammals evolved independently of each other. If one were unaware of this independence, one might logically conclude that:
A) the common ancestor of birds and mammals had a three-chambered heart.
B) birds and mammals are more distantly related than is actually the case.
C) early mammals possessed feathers.
D) the common ancestor of birds and mammals had a four-chambered heart.
E) birds and mammals should be placed in the same class.



24) Which of the following is true regarding the hypothetical phylogeny of species A-F, with regards to traits I-IV?
A) Trait III is a synapomorphy defining species D, E, and F.
B) Trait I is a plesiomorphy defining species B
C) Trait IV is analogous in species A, B, and C
D) Trait I is homologous in species B and E
E) Trait IV is a synapomorphy defining species A, B, and C

25) Which of the following is a characteristic distinguishing Archeans from Bacteria?
A) DNA in chromosomes.
B) Circular DNA.
C) A membrane-bound nucleus.

D) Phospholipid membranes with branched isoprene chains
E) A cell wall.

26) Which of the following is/are (a) relatively reliable way(s) of classifying bacteria?
A) Gram staining
B) Based on ecological evidence, such as whether or not they are decomposers
C) Based on metabolic characteristics, such as whether or not they photosynthesize
D) Molecular phylogenies
E) A and D

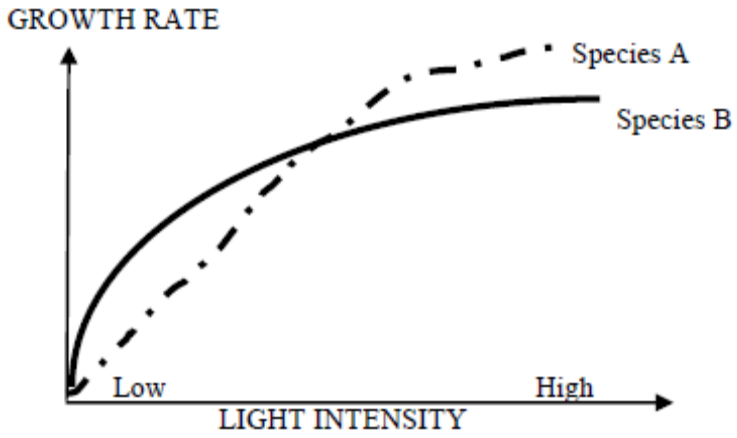
27) Which of the following is/are tenet(s) of the Endosymbiont Theory?
A) Mitochondria resulted from the symbiosis between an ancestral proto-eukaryotic cell and an archaean.
B) Mitochondria resulted from the symbiosis between an ancestral proto-eukaryotic cell and aerobic bacteria.
C) Chloroplasts resulted from the symbiosis between an ancestral proto-eukaryotic cell and aerobic bacteria
D) The nucleus resulted from the symbiosis between an ancestral proto-eukaryotic cell and aerobic bacteria.
E) A and C.

28) The name of the organism that causes Lyme disease is:
A) *Borellia*
B) *Helicobacter pylori*
C) *Bdellovibrio*
D) *Vibrio cholerae*
E) *Rhizobium*

29) You inspect the flagellum of an unknown protist and see crystalline rod structures. Your protist is likely a(n):
A) Diplomonad
B) Euglenozoan
C) Dinoflagellate
D) Stramenopile
E) Foraminiferan

30) The organism responsible for the Irish Potato famine is…
A) a diatom.
B) a radiolarian.
C) an oomycete.
D) a mycetozoan.
E) an actinomycete.

31.



The figure above shows growth, as a function of sunlight for two tree species in a forest.
If a forest area were cleared and then allowed to regrow, which species would dominate in the early successional stage and why? Pay particular attention to the axes on the graphs.

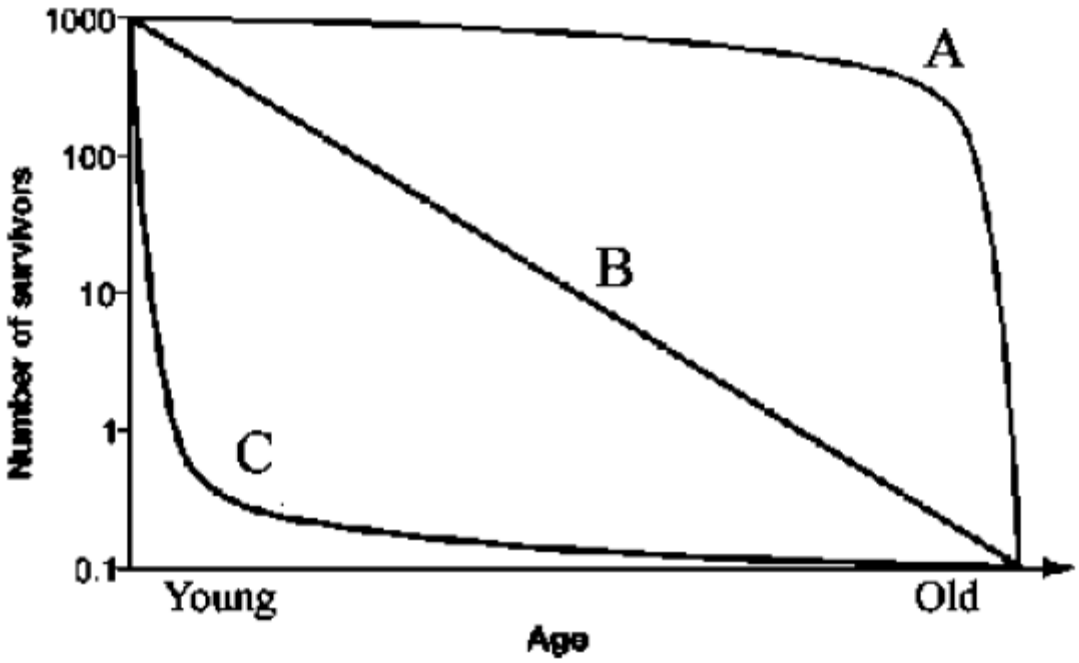
a) Species A because it is better adapted to growth in low light conditions.
b) Species B because it is better adapted to growth in low light conditions.
c) Species A because it is better adapted to growth in high light conditions.
d) Species B because it is better adapted to growth in high light conditions.

32. Which of the following is the correct order for a single iteration of the scientific method:

I Generate hypothesis
II Test predictions
III Generate predictions
IV Make observations
V Ask question

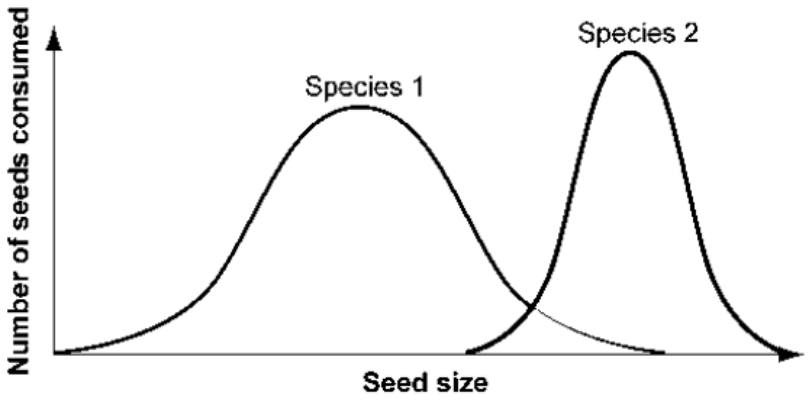
a) IV --> V --> III --> I --> II
b) I --> II --> III --> IV--> V
c) IV --> V --> I --> III --> II
d) I --> IV --> III --> II--> V

33. Following a forest fire, weedy annual grass species invade an area. They grow rapidly and colonize all parts of the area. After several years, a shrub species begins to out compete and replace the grasses. The deeper root system of the shrub is able to use water deep in the soil that is unavailable to the annual grass species. Which of the following statements is most appropriate?
a) This is an example of competitive exclusion
b) This is an example of facilitation.
c) The 'K-selected' shrubs outcompete the 'r-selected' weeds.
d) This is an example of a degradative succession.



34. In the above diagram, which of the following survivorship curves implies that an animal may lay thousands of eggs, of which only a few will survive to reproduce?

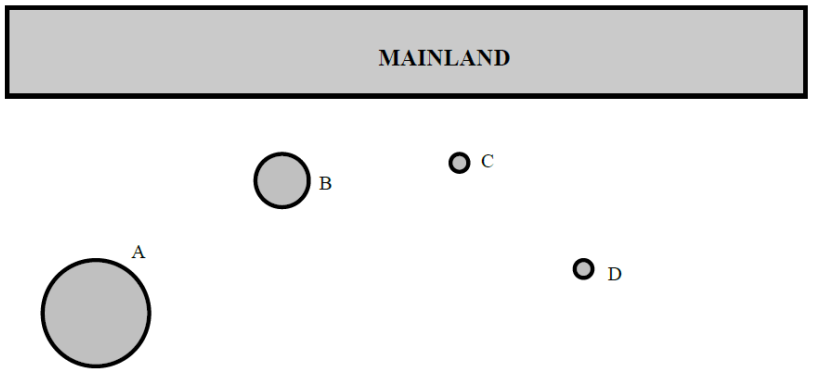
a) Curve A
b) Curve B
c) Curve C
d) Curve A and C
e) Not enough information provided



35. Examining figure above, what conclusions can be drawn?

a) Both species eat all sizes of seeds.
b) Both species compete for seeds of intermediate size.
c) Both species compete for all sizes of seeds.
d) Both species compete for all sizes of seeds other than those of intermediate size.

36. A population that has a relatively low r-value will most likely:
a) have large clutches and a large amount of offspring
b) have an early age at first reproduction and a short generation time.
c) produce few offspring, each of which has high competitive abilities.
d) be regulated by density-independent factors.

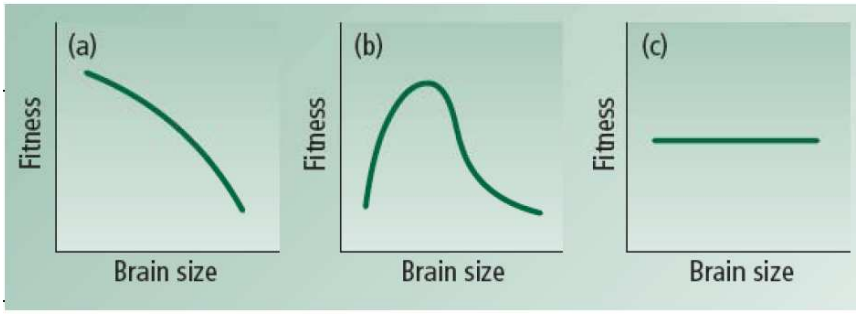


37. In the figure above, which island has the lowest extinction rate?
a) A
b) B
c) C
d) D

38. The intermediate disturbance hypothesis proposes that:
a) disturbances within a community will always cause an intermediate level of diversity.
b) through time all communities will experience an intermediate level of disturbance.
c) the highest diversity in communities is maintained by an intermediate level of disturbance.
d) community diversity is always reduced by disturbance.
e) species that are disturbed frequently have intermediate levels of abundance within communities.

39. In what populations does exponential growth tend to occur?
a) In populations that colonize new habitats.
b) In populations that experience intense competition.
c) In populations that experience high rates of predation
d) In metapopulations
e). A and D

40. An aquatic animal has a dark backside and a lighter underside. This animal is:
a). Countershaded
b). Bicolourated
c). Has aposematic colouration
d). Has cryptic colouration
e). None of the above



41. In the graphs above, what type of selection is taking place in each of the figures?
a). a- disruptive b- directional c- stabilizing
b). a- directional b- disruptive c- stabilizing
c). a- directional b- stabilizing c- no selection
d) a- stabilizing c- disruptive c- directional
e). A- disruptive c- directional c- no selection
42. Darwin proposed that natural selection occurs in an environment by
(A) favoring heritable features that make the organism better suited to survive and reproduce
(B) producing a constant number of offspring while in that environment
(C) surviving for a fixed amount of time
(D) resisting the environment and keeping the environment from changing
(E) favoring those individuals with the most favorable acquired characteristics.

43. A behavior that has evolved to aid relatives, although at personal risk, and thus increases the chance of your genes being passed on to the next generation is known as
a) altricial behavior
b) instinctive behavior
c) kin selection
d) operant conditioning
e) adaptive behavior

44. The type of speciation that geographically isolates populations and results in the divergence of distinct species is called _____ speciation.
a) gradual
b) sympatric
c) allopatric
d) sexual
e) adaptive

45. You are studying a population of geese in which there are two color phases, brown and gray. Color in this species is controlled by a single gene, with brown dominant to gray. A random sample of 250 geese shows that 210 are brown. What percentage of the geese are heterozygous? (Assume that the population is in Hardy-Weinberg equilibrium.
(A) 36%
(B) 43%
(C) 48%
(D) 57%
(E) 84%.

46. In disruptive selection, over time
(A) a population goes extinct
(B) the most extreme outliers of a population are eliminated (e.g., the largest beaks and smallest beaks are eliminated)
(C) the population is strongly selected for in one direction (e.g., larger beak size)
(D) the population is strongly selected for in two directions (e.g., larger beak size and smaller beak size)
(E) a population increases its variation (e.g., a wide selection of all beak sizes).

47. Adaptive radiation is best described as the
(A) existence of groups of closely related species recently evolved from a common ancestor
(B) existence of groups of distantly related species recently evolved from a common ancestor
(C) existence of groups of closely related species recently evolved from different ancestors through hybridization
(D) existence of individuals of closely related species that originated in different areas within diverse habitats, but that have rejoined as a single species.

48. A type of isolating mechanism that leads to reproductive isolation by preventing the formation of hybrid zygotes is called _____ isolating mechanism.
(A) hybridization
(B) postzygotic
(C) prezygotic
(D) adaptive
(E) differential

49. Humans with the genotype DD and Dd show the Rh+ blood phenotype, whereas those with the genotype dd show the Rh- blood phenotype. In a sample of 400 Basques from Spain, 230 people were Rh+ and 170 people were Rh -. Assuming that this population is in Hardy-Weinberg equilibrium, what is the allele frequency of the allele D?
a. 0.349
b. 0.652
c. 0.425
d. 0.575
e. 0.288

50. Which of the following populations is in Hardy- Weinberg equilibrium?
I. AA = 80, Aa = 280, aa = 640
II. AA= 1153, Aa=1414, aa= 433
III. S = 73, Ss = 394 and ss = 533

a). I
b). II
c). III
d). I and II
e). II and III