









Evolution Review

Biology

1. Information related to the organisms found on Earth during various geological time periods is represented in the chart below.

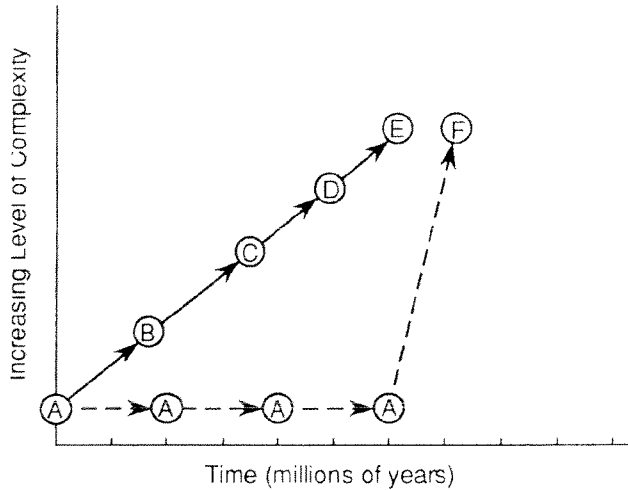
Common Organisms				
				
	4.6 (?) Billion Years Ago	600 Million Years Ago	200 Million Years Ago	60 Million Years Ago
	Precambrian (Simple Multicellular Organisms and First Protists)	Paleozoic (Age of Amphibians, Fishes, and Invertebrates)	Mesozoic (Age of Reptiles)	Cenozoic (Age of Mammals)

Past
←
→
 Present
Geologic Time

Which statement concerning the first appearance of the organisms over the time period represented in this chart is most likely correct?

- 1) Life on Earth has remained the same.
- 2) Life on Earth has changed from primitive organisms to more complex organisms.
- 3) Life on Earth began with complex organisms and changed to more complex organisms.
- 4) Life on Earth has changed rapidly.

2. Letters *A* through *F* on the graph below represent different species that are related but show different structural, functional, and behavioral adaptations.



One inference that can be drawn from the graph is that

- 1) speciation occurs only gradually, over long periods of time
 - 2) species *E* is the ancestor of species *F*
 - 3) species *E* resulted from the extinction of species *A*, *B*, *C*, and *D*
 - 4) speciation may be either gradual or abrupt
3. The first life-forms to appear on Earth were most likely
- 1) complex single-celled organisms
 - 2) complex multicellular organisms
 - 3) simple single-celled organisms
 - 4) simple multicellular organisms

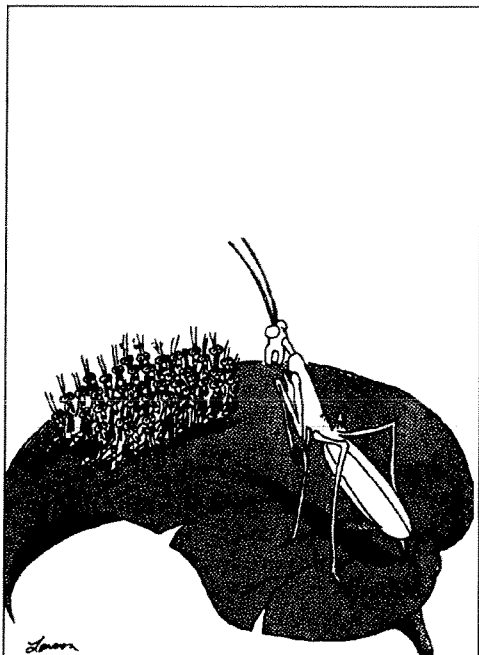
4. Organism *X* appeared on Earth much earlier than organism *Y*. Many scientists believe organism *X* appeared between 3 and 4 billion years ago, and organism *Y* appeared approximately 1 billion years ago. Which row in the chart below most likely describes organisms *X* and *Y*?

Row	Organism X	Organism Y
(1)	simple multicellular	unicellular
(2)	complex multicellular	simple multicellular
(3)	unicellular	simple multicellular
(4)	complex multicellular	unicellular

5. Lamarck proposed that new organs evolved according to the
- 1) needs of the organism
 - 2) process of natural selection
 - 3) role of mutation
 - 4) sorting out of genes
6. One explanation for the variety of organisms present on Earth today is that over time
- 1) new species have adapted to fill available niches in the environment
 - 2) evolution has caused the appearance of organisms that are similar to each other
 - 3) each niche has changed to support a certain variety of organism
 - 4) the environment has remained unchanged, causing rapid evolution
7. Sheep and pigs have more enzymes in common than sheep and frogs do. This finding may indicate that
- 1) none of these animals are related
 - 2) frogs are not related to pigs
 - 3) sheep are more closely related to pigs than to frogs
 - 4) frogs are more closely related to sheep than to pigs

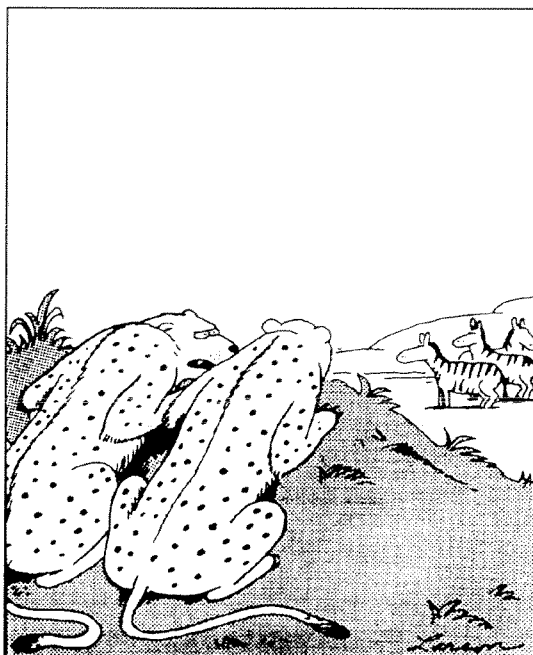
8. Base your answer on one of the cartoons below, which refer to certain concepts of natural selection, and on your knowledge of biology.

Cartoon 1



"Of course, long before you mature, most of you will be eaten."

Cartoon 2



"Listen... I'm fed up with this 'weeding out the sick and the old' business... I want something in its prime."

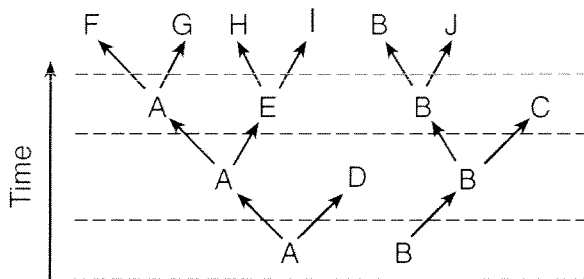
Select one cartoon and Identify *one* concept represented in that cartoon, and explain how this concept supports the theory of natural selection. Your answer must:

- identify *one* concept represented in the cartoon you choose
- briefly explain the concept you identified
- explain the relationship between this concept and the process of natural selection

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9. The concept that, due to a need, organisms acquired the ability to move from an aquatic environment onto the land is most closely associated with a theory proposed by
- 1) Weismann
 - 2) Lamarck
 - 3) Miller
 - 4) Mendel
10. According to the heterotroph hypothesis, some early heterotrophs evolved into autotrophs because of their ability to synthesize organic compounds from water and
- 1) carbon dioxide
 - 2) hydrochloric acid
 - 3) oxygen
 - 4) hydrogen
11. Modern evolutionary theory has modified the theory of natural selection by
- 1) considering survival of the fittest to be invalid
 - 2) showing that competition does not exist within species
 - 3) including a genetic basis for change and variation
 - 4) accepting the theory of use and disuse
12. Over a long period of time the organisms on an island changed so that they could no longer interbreed with the organisms on a neighboring island. This inability to interbreed is known as
- 1) hybridization
 - 2) reproductive isolation
 - 3) artificial selection
 - 4) survival of the fittest
13. Differences between the members of a population will most likely be passed to future generations if they are
- 1) due to genetic changes and result in unfavorable variations
 - 2) due to genetic changes and result in favorable variations
 - 3) not due to genetic changes and result in unfavorable variations
 - 4) not due to genetic changes and result in favorable variations

14. Some behaviors such as mating and caring for young are genetically determined in certain species of birds. The presence of these behaviors is most likely due to the fact that
- 1) birds do not have the ability to learn
 - 2) individual birds need to learn to survive and reproduce
 - 3) these behaviors helped birds to survive in the past
 - 4) within their lifetimes, birds developed these behaviors
15. In the past, a specific antibiotic was effective in killing a certain species of bacteria. Now, most members of this bacterial species are resistant to this antibiotic. Explain how this species of bacteria has become resistant. Your answer must include at least the concepts of:
- overproduction
 - variation
 - natural selection
 - adaptation to the environment
16. Base your answer to the following question on the diagram below and on your knowledge of biology.

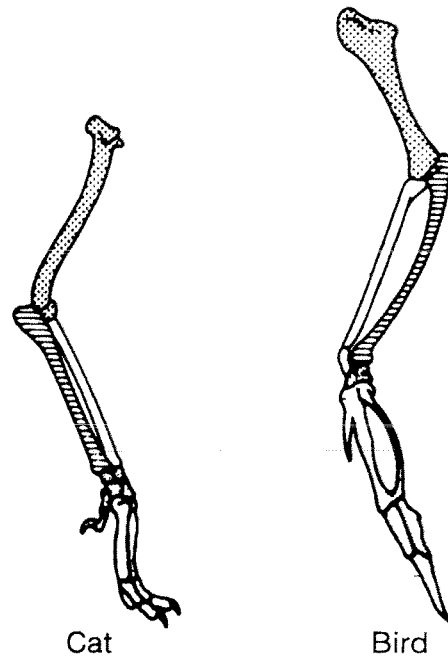
Letters *A* through *J* represent different species of organisms. The vertical distances between the dotted lines represent long periods of time in which major environmental changes occurred.



Which species was the first to become extinct?

- 1) *E*
- 2) *J*
- 3) *C*
- 4) *D*

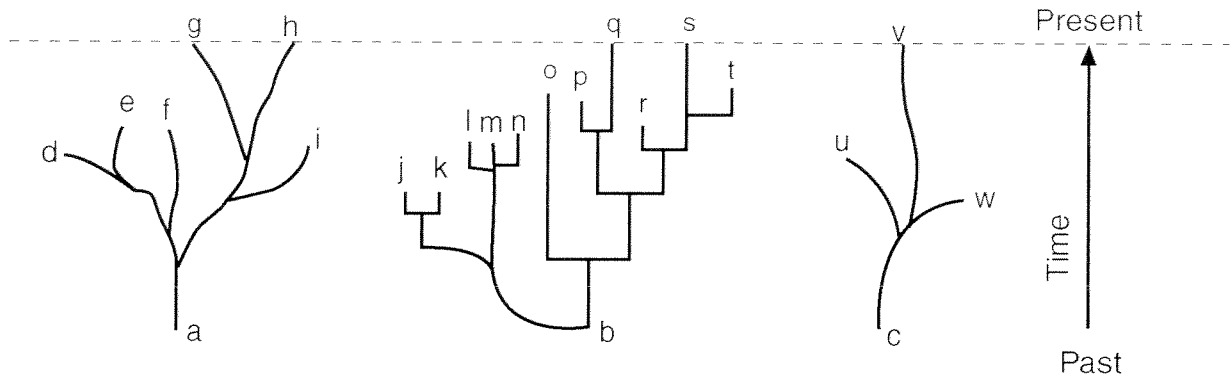
17. The diagram below shows the bones in the forelimbs of two different vertebrate species.



The position and structure of these bones could best be used to make inferences about the

- 1) food preferences of these vertebrate species
- 2) intelligence of these vertebrate species
- 3) history of these vertebrate species
- 4) reproductive behavior of these vertebrate species

18. According to some scientists, patterns of evolution can be illustrated by the diagrams below.



Which statement best explains the patterns seen in these diagrams?

- 1) The organisms at the end of each branch can be found in the environment today.
- 2) The organisms that are living today have all evolved at the same rate and have undergone the same kinds of changes.
- 3) Evolution involves changes that give rise to a variety of organisms, some of which continue to change through time while others die out.
- 4) These patterns cannot be used to illustrate the evolution of extinct organisms.

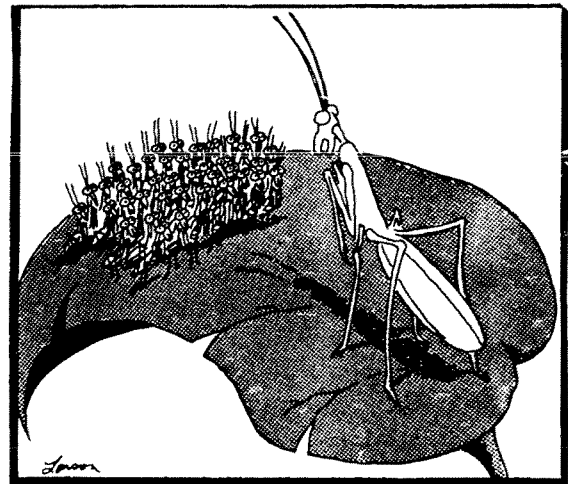
19. If a species of bear in Russia and the brown bear in the United States have a common ancestor, the differences between these two species most likely resulted from

- 1) mutations and genetic recombination
- 2) mutations and asexual reproduction
- 3) the inheritance of acquired traits
- 4) the development of structures for climbing trees

20. Based on Lamarck's theory of evolution, the human appendix decreased in size and lost its digestive function because

- 1) inherited mutations caused the appendix to become useless
- 2) development of useless organs conserved energy
- 3) the appendix was not needed or used as a digestive organ
- 4) humans with a small appendix were better adapted to survive in their environment

21. Which evolutionary concept is best illustrated by the cartoon below?

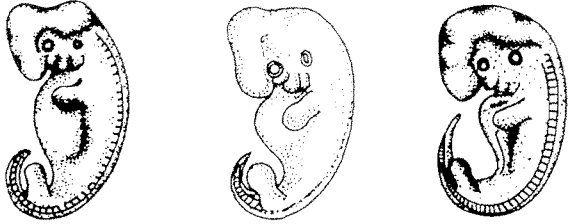


- 1) production of mutations
- 2) use and disuse
- 3) survival of the fittest
- 4) speciation

22. One concept that supports the theory of evolution states that organisms best adapted for survival are the ones that will reproduce and pass traits on to future generations. Adaptations that can be passed on do *not* include

- 1) the basic structure of the organism
- 2) the reflex actions of the organism
- 3) the manner in which the organism carries out respiration
- 4) techniques for hunting food taught by the parents of the organism

23. The diagrams below show embryos of three different vertebrate species.



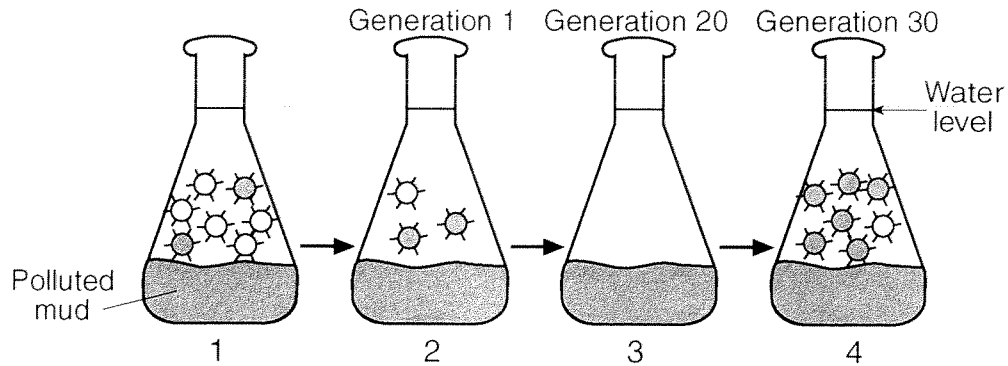
According to one theory, similarities in these embryos suggest common ancestry. As these embryos mature, they will most likely

- 1) develop new organs according to the nutritional requirements of each organism
 - 2) continue to closely resemble each other as adults
 - 3) show no similarity as adults
 - 4) develop the distinctive characteristics of their species
24. Fossils would most likely be found in
- 1) amber that is over 8 billion years old
 - 2) icebergs that are 500 billion years old
 - 3) sedimentary rocks that are 500 million years old
 - 4) volcanic rocks that are 50 million years old
25. Even though the environment changes, a population that occupies a given geographic area will most likely continue to be found in this area if the
- 1) variations in the population decrease over time
 - 2) members of the population decrease in number
 - 3) members of the population exceed the carrying capacity
 - 4) population passes on those genes that result in favorable adaptations
26. A factor that tends to cause species to change is a
- 1) stable environment
 - 2) lack of migration
 - 3) recombination of genes
 - 4) decrease of mutations

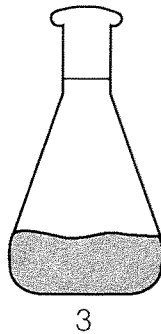
27. Base your answer to the following question on the information below.

Over the last 30 years, a part of the Hudson River known as Foundry Cove has been the site for many factories that have dumped toxic chemicals into the river. Some of these pollutants have accumulated in the mud at the bottom of the river. The polluted cove water contains many single-celled organisms and simple multicellular animals. Curiously, when the same species from nearby regions with nonpolluted sediments are moved to the polluted cove water, they die.

Scientists hypothesized that the organisms living in the cove have evolved so that they are able to survive in polluted water. To test this hypothesis, biologists tried to duplicate the history of the cove in the laboratory. They took a large number of one species of simple animal from a cove with unpolluted mud and placed them in a flask that contained polluted mud from Foundry Cove (diagram 1). Most of the animals died, but a few survived (diagram 2). The scientists then bred the survivors with each other for several generations producing offspring that were descendants of the survivors. When placed in Foundry Cove, most of these descendants survived. The diagrams below represent the steps in this investigation.

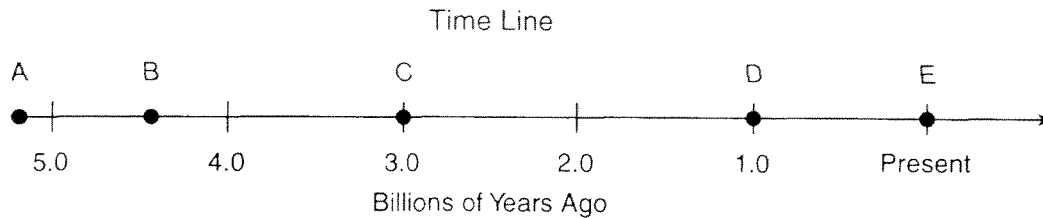


☉ = Pollution-sensitive individuals ☉ = Pollution-resistant individuals



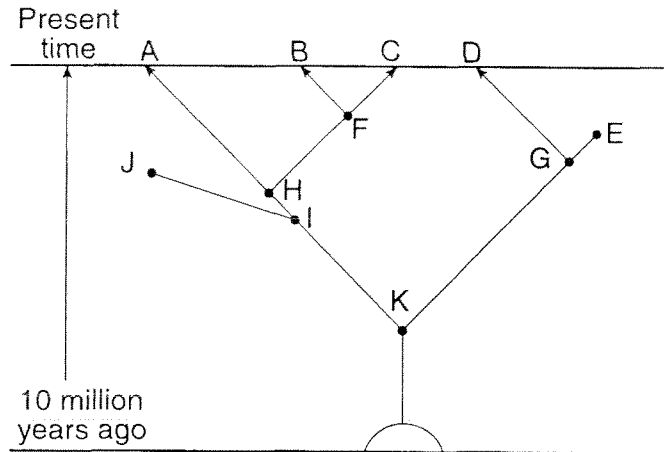
On the diagram of the flask above, sketch the animals that would be present in flask 3 after several generations of breeding in the laboratory.

28. According to the interpretation of the fossil record by many scientists, during which time interval shown on the time line below did increasingly complex multicellular organisms appear on Earth?



- 1) *A to B* 2) *B to C* 3) *C to D* 4) *D to E*
-
29. A man lifts weights and develops large arm muscles. His son has larger muscles than his father had at the same age. According to Lamarck's theory, this situation is due to
- 1) competition between father and son
 - 2) survival of the fittest
 - 3) inheritance of acquired characteristics
 - 4) mutagenic agents
30. In a certain area, DDT-resistant mosquitoes now exist in greater numbers than ten years ago. What is the most probable explanation for this increase in numbers?
- 1) Genetic differences permitted some mosquitoes to survive DDT use.
 - 2) Mosquito eggs were most likely to have been fertilized-when exposed to DDT.
 - 3) DDT acted as a reproductive hormone for previous generations of mosquitoes.
 - 4) DDT serves as a new source of nutrition.
31. Which statement about the rates of evolution for different species is in agreement with the theory of evolution?
- 1) They are identical, since the species live on the same planet.
 - 2) They are identical, since each species is at risk of becoming extinct.
 - 3) They are different, since each species has different adaptations that function within a changing environment.
 - 4) They are different, since each species has access to unlimited resources within its environment.

Base your answers to questions 32 and 33 on the diagram below. The diagram shows an interpretation of relationships based on evolutionary theory. The letters represent different species.



32. Which species are *least* likely to be vital parts of a present-day ecosystem?
- 1) A and E
 - 2) C and D
 - 3) E and J
 - 4) B and F
33. The diagram indicates that a common ancestor for species C and E is species
- 1) F
 - 2) G
 - 3) H
 - 4) K

34. Studies that reveal the similarities in the development that occurs in reptile eggs and bird eggs are often used to trace possible pathways of evolution. These studies are part of the research in the field of comparative

- 1) anatomy
- 2) embryology
- 3) biochemistry
- 4) cytology

35. A large population of houseflies was sprayed with a newly developed, fast-acting insecticide. The appearance of some houseflies that are resistant to this insecticide supports the concept that

- 1) species traits tend to remain constant
- 2) biocides cause mutations
- 3) variation exists within a species
- 4) the environment does not change

36. Which process is primarily responsible for maintaining variation in a population?

- 1) sexual reproduction
- 2) binary fission
- 3) spore formation
- 4) vegetative propagation

37. How does modern evolutionary theory relate to Darwin's concepts of variation and natural selection?

- 1) It includes Darwin's concept of variation, but not his theory of natural selection.
- 2) It includes Darwin's concept of variation and his theory of natural selection.
- 3) It does not include Darwin's concept of variation or his theory of natural selection.
- 4) It does not include Darwin's concept of variation, but it includes his theory of natural selection.

38. After the Industrial Revolution, dark-colored moths outnumbered light-colored moths in certain regions of England. Within the past 40 years, factories in these regions have added scrubbers and air purifiers to their smokestacks, and the relative number of light-colored moths has increased. The probable reason for this increase is that

- 1) the allele for light color became dominant over the allele for dark color
- 2) the environment favored the survival of light-colored moths over dark-colored moths
- 3) dark-colored moths turned light because they needed to survive
- 4) overpopulation occurred and most of the light-colored moths died, leaving only dark-colored moths to reproduce

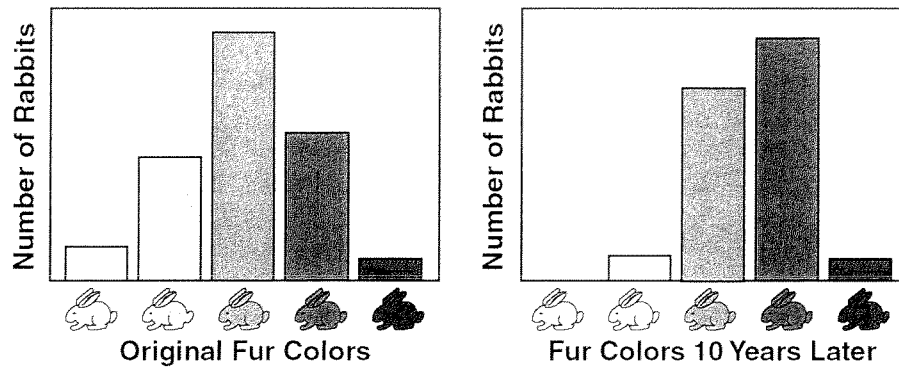
39. From the information given in the chart below, which two organisms are most closely related?

	ENZYME TYPE			
	1	2	3	4
A	X		X	
B				X
C	X	X	X	X
D	X		X	X

X = Enzyme present in organism

- 1) A and B
- 2) B and C
- 3) C and D
- 4) D and B

40. The diagram below illustrates the change that occurred in the physical appearance of a rabbit population over a 10-year period.



Which condition would explain this change over time?

- 1) a decrease in the mutation rate of the rabbits with black fur
- 2) a decrease in the advantage of having white fur
- 3) an increase in the advantage of having white fur
- 4) an increase in the chromosome number of the rabbits with black fur

41. According to the heterotroph hypothesis, in addition to water, the raw materials used to produce the most primitive life forms on Earth were probably

- 1) nitrogen, carbon dioxide, and oxygen
- 2) hydrogen, methane, and ammonia
- 3) carbon monoxide, ammonia, and oxygen
- 4) hydrogen, oxygen, and nitrogen

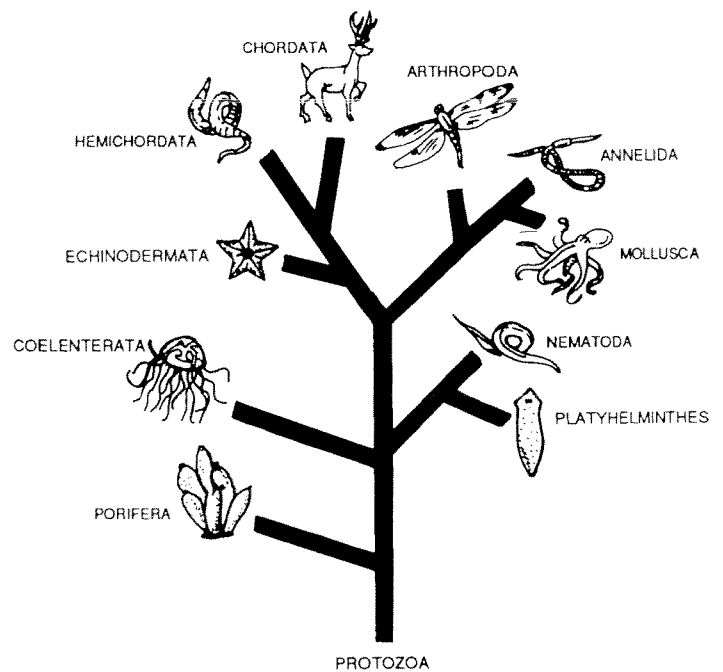
42. Which process would have the *least* influence on the rate of evolutionary change?

- 1) sexual reproduction
- 2) mutation
- 3) meiosis
- 4) asexual reproduction

43. The Florida panther, a member of the cat family, has a population of fewer than 100 individuals and has limited genetic variation. Which inference based on this information is valid?

- 1) These animals will begin to evolve rapidly.
- 2) Over time, these animals will become less likely to survive in a changing environment.
- 3) These animals are easily able to adapt to the environment.
- 4) Over time, these animals will become more likely to be resistant to disease.

44. Base your answer to the following question on the diagram below and on your knowledge of biology. The diagram illustrates one possible scheme of evolution among various groups of organisms.



Which two groups of organisms in the diagram are shown to be most closely related?

- 1) Porifera and Echinodermata
- 2) Chordata and Platyhelminthes
- 3) Mollusca and Annelida
- 4) Arthropoda and Coelenterata

45. Which concept includes the other three?
1) competition 3) natural selection
2) survival of the fittest 4) overproduction
46. Characteristics of a species that make its members better able to live and reproduce in their environment are known as
1) favorable adaptations 3) abiotic factors
2) homologous structures 4) biotic factors
47. Fossil records indicate that between 80 million and 60 million years ago the structure of the horned dinosaur frequently underwent rapid changes separated by long periods of stability. This pattern of change best illustrates the concept of
1) use and disuse 3) gradualism
2) punctuated equilibrium 4) enzyme specificity
48. Which factor has the greatest effect on the rate of evolution of animals?
1) environmental changes 3) asexual reproduction
2) use and disuse 4) vegetative propagation
49. Which is an example of evolution?
1) development of the modern horse from earlier horse species
2) development of muscle tissue from embryonic mesoderm
3) replacement of a lost claw of a lobster
4) germination of a 100-year-old spore when moistened
50. A possible explanation for the differences in structure, function, and behavior between chimpanzees and humans is provided by the
1) heterotroph hypothesis 3) cell theory
2) lock-and-key model 4) theory of evolution
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