Name: _____

UNIT: EVOLUTION

TOPIC: NATURAL SELECTION

1) Which of the following statements is most closely related to the modern theory of evolution?
   1) Asexual reproduction increases the survival of species.
   2) Organisms best adapted to a changed environment are more likely to reproduce and pass their genes to offspring.
   3) Characteristics that are acquired during life are passed to offspring by sexual reproduction.
   4) Evolution is the result of mutations and recombination, only.

2) The theory of biological evolution includes the concept that
   1) individuals may acquire physical characteristics after birth and pass these acquired characteristics on to their offspring
   2) fossils are the remains of present-day species and were all formed at the same time
   3) species of organisms found on Earth today have adaptations not always found in earlier species
   4) the smallest organisms are always eliminated by the larger organisms within the ecosystem

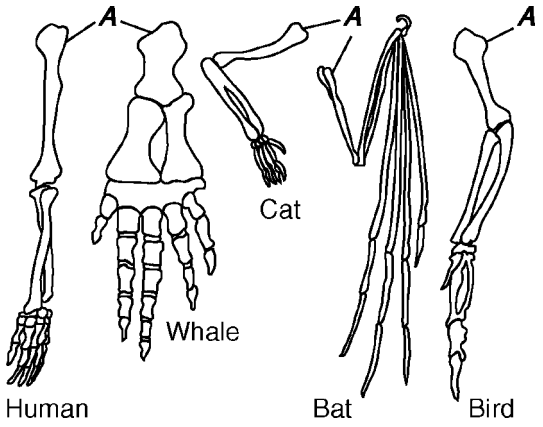
3) Natural selection and its evolutionary consequences provide a scientific explanation for each of the following *except*
   1) similar structures among different organisms
   2) the fossil record
   3) a stable physical environment
   4) protein and DNA similarities between different organisms

4) To determine evolutionary relationships between organisms, a comparison would most likely be made between all of the characteristics below *except*
   1) sequences in their DNA molecules
   2) number of their ATP molecules
   3) structure of protein molecules present
   4) methods of reproduction

5) Species of bacteria can evolve more quickly than species of mammals because bacteria have
   1) less competition
   2) lower mutation rates
   3) more chromosomes
   4) higher rates of reproduction

6) The presence of some similar structures in all vertebrates suggests that these vertebrates
   1) all develop at the same rate
   2) may have an evolutionary relationship
   3) evolved from different animals that appeared on Earth at the same time
   4) all develop internally and rely on nutrients supplied by the mother

7) The similarities of the bones labeled *A* in the diagram below provide evidence that



   1) all structural characteristics are the same in animals
   2) all species have one kind of bone structure
   3) the cells of the bones contain the same type of mutations
   4) the organisms may have evolved from a common ancestor

8) In a group of mushrooms exposed to a poisonous chemical, only a few of the mushrooms survived. The *best* explanation for the resistance of the surviving mushrooms is that the resistance
   1) was transferred through the food web to the mushrooms
   2) developed in response to the poisonous chemical
   3) resulted from the presence of mutations in the mushrooms
   4) was transmitted to the mushrooms from the poisonous chemical

9) In several species of birds, the males show off their bright colors and long feathers. The dull-colored females usually pick the brightest-colored males for mates. Male offspring inherit their father's bright colors and long feathers. Compared to earlier generations, future generations of these birds will be expected to have a greater proportion of
   1) bright-colored females
   2) dull-colored females
   3) bright-colored males
   4) dull-colored males

10) A basketball player develops speed and power as a result of practice. This athletic ability will *not* be passed on to her offspring because
   1) muscle cells do not carry genetic information
   2) base sequences in DNA are not affected by this activity
   3) gametes do not carry complete sets of genetic information
   4) mutations that occur in body cells are not inherited

11) Certain insects resemble the bark of the trees on which they live. Which statement provides a possible biological explanation for this resemblance?
   1) Natural selection played a role in the development of this protective coloration.
   2) The lack of mutations resulted in the protective coloration.
   3) The trees caused mutations in the insects that resulted in protective coloration.
   4) The insects needed camouflage so they developed protective coloration.

12) The teeth of carnivores are pointed and are good for puncturing and ripping flesh. The teeth of herbivores are flat and are good for grinding and chewing. Which of the following statements *best* explains these observations?
   1) The two types of teeth most likely evolved as a result of natural selection.
   2) Carnivores have evolved from herbivores.
   3) Herbivores have evolved from carnivores.
   4) The two types of teeth most likely evolved as a result of the needs of an organism.

13) Meiosis and fertilization are important for the survival of many species because these two processes result in
   1) increasingly complex multicellular organisms
   2) large numbers of gametes
   3) cloning of superior offspring
   4) genetic variability of offspring

14) Which two processes result in variations that commonly influence the evolution of sexually reproducing species?
   1) extinction and gene replacement
   2) environmental selection and selective breeding
   3) mutation and genetic recombination
   4) mitosis and natural selection

15) Which process will increase variations that could be inherited?
   1) synthesis of proteins
   2) mitotic cell division
   3) active transport
   4) recombination of genes

16) Which characteristics of a population would most likely indicate the *lowest* potential for evolutionary change in that population?
   1) sexual reproduction and many mutations
   2) sexual reproduction and few mutations
   3) asexual reproduction and few mutations
   4) asexual reproduction and many mutations

17) Which of the following statements describes asexual reproduction?
   1) It is responsible for many new variations in off spring.
   2) Mutations are not passed from generation to generation.
   3) It always enables organisms to survive in changing environmental conditions.
   4) Adaptive traits are usually passed from parent to offspring without genetic modification.

18) Which factor could be the cause of the other three in an animal species?
   1) the inability of the species to adapt to changes
   2) a lack of genetic variability in the species
   3) extinction of the species
   4) a decrease in the survival rate of the species

19) Which process is least likely to add to the variety of traits in a population?
   1) genetic engineering
   2) accurate replication of DNA
   3) deletion of bases from DNA
   4) exchange of segments between chromosomes

20) In an environment that undergoes frequent change, species that reproduce sexually may have an advantage over species that reproduce asexually because the sexually reproducing species produce
   1) offspring with more variety
   2) identical offspring
   3) more offspring in each generation
   4) new species of offspring in each generation

21) Which factor is least likely to contribute to an increase in the rate of evolution?
   1) environmental selection of organisms best adapted to survive
   2) chromosomal recombinations
   3) a long period of environmental stability
   4) presence of genetic variations in a population

22) Scientists compared fossil remains of a species that lived 5,000 years ago with members of the same species living today. Scientists concluded that this species had changed very little over the entire time period. Which statement *best* accounts for this lack of change?

1) The environment did not change significantly and those offspring expressing new characteristics did not survive.
2) The environment changed significantly, but the species had no natural enemies for a long period of time.
3) The environment did not change significantly and those offspring expressing new characteristics survived their natural enemies.
4) The environment changed significantly and those offspring without favorable characteristics died.

23) Mutations that occur in skin or lung cells have little effect on the evolution of a species because mutations in these cells

1) cannot be passed on to offspring
2) usually lead to the death of the organism
3) lead to more serious mutations in offspring
4) are usually beneficial to the organism

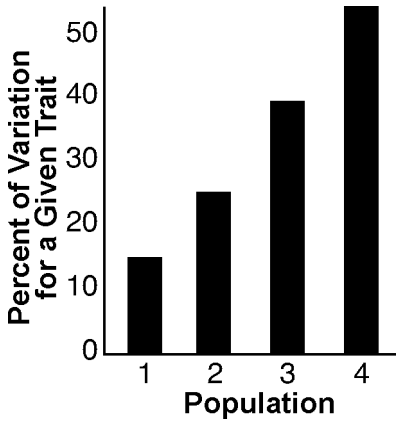
24) Thousands of years ago, giraffes with short necks were common within giraffe populations. Nearly all giraffe populations today have long necks. This difference could be due to

1) giraffes stretching their necks so they could reach food higher in the trees
2) a mutation in genetic material controlling neck size occurring in some skin cells of a giraffe
3) giraffes stretching their necks to keep their heads out of reach of predators
4) a mutation in genetic material controlling neck size occurring in the reproductive cells of a giraffe

25) When a particular white moth lands on a white birch tree, its color has a high adaptive value. If the birch trees become covered with black soot, the white color of this particular moth in this environment would most likely

1) increase in adaptive value
2) change to a more adaptive black color
3) decrease in adaptive value
4) retain its adaptive value

26) The graph below shows the percent of variation for a given trait in four different populations of the same species. The populations inhabit similar environments.



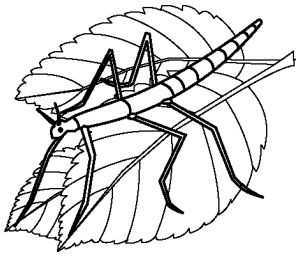
In which population will the g*reatest* number of individuals most likely survive if a significant environmental change related to the trait occurs?

1) 1 2) 2 3) 3 4) 4

27) A variation causes the production of an improved variety of apple. What is the *best* method to use to obtain additional apple trees of this variety in the shortest period of time?

1) natural selection
2) asexual reproduction
3) hormone therapy
4) selective breeding

28) The illustration below shows an insect resting on some green leaves.



The size, shape, and green color of this insect are adaptations that would most likely help the insect to

1) make its own food
2) compete successfully with all birds
3) avoid toxic waste materials
4) hide from predators

29) Extinction of a species could result from

1) limited genetic variability in the species
2) fewer unfavorable mutations in the species
3) evolution of a type of behavior that produces greater reproductive success
4) synthesis of a hormone that controls cellular communication

30) Which factor contributed *most* to the extinction of many species?

1) inability to evolve into simple organisms
2) changes in migration patterns
3) lethal mutations
4) changes in the environment

31) When is extinction of a species most likely to occur?

1) when environmental conditions change and the adaptive traits of the species favor the survival and reproduction of some of its members
2) when environmental conditions remain the same and the proportion of individuals within the species that possess adaptive traits increases
3) when environmental conditions change and the members of the species lack adaptive traits to survive and reproduce
4) when environmental conditions remain the same and the proportion of individuals within the species that lack adaptive traits increases

32) A new chemical was discovered and introduced into a culture containing one species of bacteria. Within a day, most of the bacteria were dead, but a few remained alive. Which statement *best* explains why some of the bacteria survived?

1) They were exposed to the chemical long enough to develop a resistance to it.
2) They had a genetic variation that gave them resistance to the chemical.
3) They absorbed the chemical and broke it down in their digestive systems.
4) They mutated and became a different species after exposure to the chemical.

33) A certain plant species, found only in one particular stream valley in the world, has a very shallow root system. An earthquake causes the stream to change its course so that the valley in which the plant species lives becomes very dry. As a result, the species dies out completely. The effect of this change on this plant species is known as

1) succession
2) extinction
3) mutation
4) evolution

34) Which statement describing a cause of extinction includes the other three?

1) Members of the extinct species were too slow to escape from predators.
2) Members of the extinct species were unable to compete for food.
3) Members of the extinct species were unable to conceal their presence by camouflage.
4) Members of the extinct species lacked adaptations essential for survival.

35) A certain species has little genetic variation. The rapid extinction of this species would most likely result from the effect of

1) genetic recombination
2) gene manipulation
3) environmental change
4) successful cloning

36) Woolly mammoths became extinct thousands of years ago, while other species of mammals that existed at that time still exist today. These other species of mammals most likely exist today because, unlike the mammoths, they

1) had certain inheritable traits that enabled them to survive
2) learned to migrate to new environments
3) did not face a struggle for survival
4) produced offspring that all had identical inheritable characteristics

37) An insect pest known as the medfly significantly reduced the orange crop in California. Pesticides were used to control the medfly. Using the concept of natural selection, explain how the continued use of a certain pesticide may become ineffective in controlling this fly. Your answer must include the concepts of:

(1) variation
(2) adaptive value of a variation (adaptation)
(3) survival
(4) reproduction

38) Growers of fruit trees have always had problems with insects. Insects can cause visible damage to fruits, making them less appealing to consumers. As a result of this damage, much of the fruit cannot be sold. Insecticides have been useful for controlling these insects, but, in recent years, some insecticides have been much less effective. In some cases, insecticides do nothing to stop the insect attacks.

Provide a biological explanation for this loss of effectiveness of the insecticides. In your answer, be sure to:

(1) Identify the original event that resulted in the evolution of insecticide resistance in some insects.
(2) Explain why the percentage of resistant insects in the population has increased.
(3) Describe *one* alternative form of insect control, other than using a different insecticide, that fruit growers could use to protect their crops from insect attack.

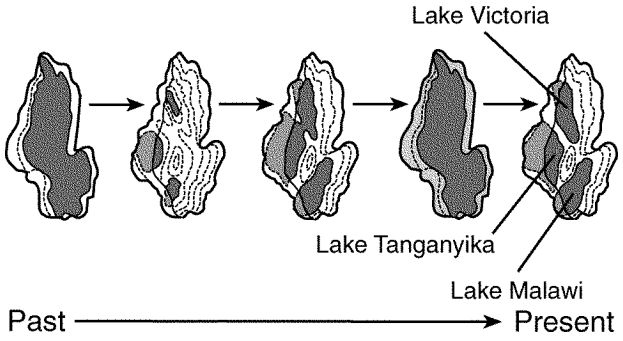
39) Two cultures, each containing a different species of bacteria, were exposed to the same antibiotic. Explain how, after exposure to this antibiotic, the population of one species of bacteria could increase while the population of the other species of bacteria decreased or was eliminated.

40) Individuals of some species, such as earthworms, have both male and female sex organs. In many cases, however, these individuals do not fertilize their own eggs. State *one* genetic advantage of an earthworm mating with another earthworm for the production of offspring.

41) A hawk has a genetic trait that gives it much better eyesight than other hawks of the same species in the same area. Explain how this could lead to evolutionary change within this species of hawk over a long period of time. In your answer, be sure to include an explanation of:
(1) competition within the hawk population
(2) survival of various individuals in the population
(3) How would the frequency of the better-eyesight trait be expected to change overtime within the population?
(4) What would most likely happen to the hawks having the better-eyesight trait if they also had unusually weak wing muscles?

Questions 42 through 44 refer to the following:

Variations in Lake Water Level



The three great lakes in Africa (Victoria, Tanganyika, and Malawi) contain a greater number of fish species than any other lakes in the world. Lake Malawi alone has 200 species of cichlid fish. The diversity of cichlid species in these African lakes could have been caused by changes in water level over thousands of years.

According to one hypothesis, at one time the three lakes were connected as one large lake and all the cichlids could interbreed. When the water level fell, groups of cichlids were isolated in smaller lakes as shown in the diagram. Over time, the groups of cichlids developed genetic differences. When the water levels rose again, the isolated populations were brought back into contact. Due to significant genetic differences, these populations were unable to interbreed. Variations in water level over thousands of years resulted in today's diversity of cichlid species.

42) Which discovery would support the explanation of cichlid diversity discussed in the reading passage?
1) Once formed, the lakes remained isolated from each other.
2) The water level changed little over time.
3) Differences between cichlid species are small and interbreeding is possible.
4) The local conditions in each of the small lakes were very different.

43) According to the information given, as the water level of the lakes changed, many species of cichlids survived while others became extinct. State why some species survived while others became extinct.

44) According to the reading passage, each cichlid population is genetically different from the other cichlid populations. State *one* reason for these genetic differences.

Questions 45 through 47 refer to the following:

Cytochrome c is an enzyme located in the mitochondria of many types of cells. The number of differences in the amino acid sequences of Cytochrome c from different species are compared to human Cytochrome c in the data table below.

Differences in Amino Acid Sequences

Organism	Number of Differences in Cytochrome c Compared to Humans
Tuna	21
Mold	48
Moth	31
Dog	11
Horse	12
Chicken	13
Monkey	1

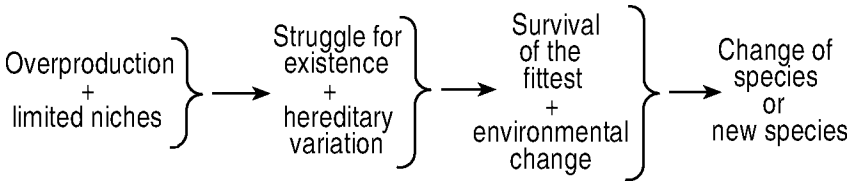
45) Of the organisms listed below, which one has a DNA code for Cytochrome c that is *most* similar to that of a human?
1) tuna
2) chicken
3) dog
4) moth

46) The fact that all of the organisms in the given data table contain Cytochrome c could lead to the inference that
1) Cytochrome c is essential for the reproduction of all organisms
2) these organisms have all evolved from an ancestor that produced Cytochrome c
3) only heterotrophs make Cytochrome c
4) mutations in genes that code for Cytochrome c always occur during DNA replication

47) Cytochrome c is most likely a

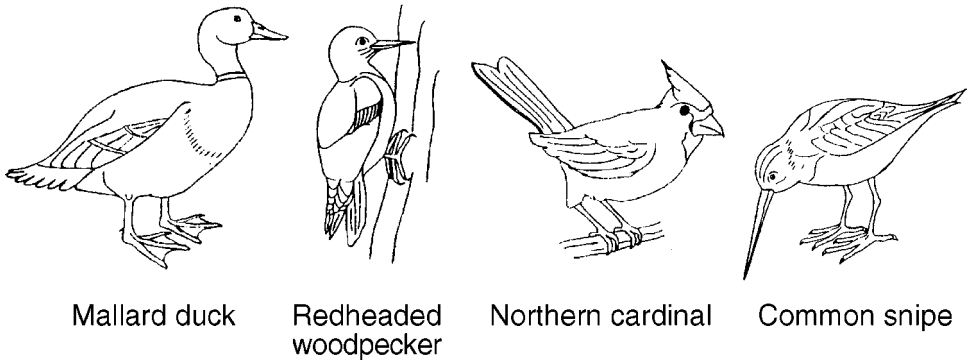
1) material containing genes
2) protein molecule
3) component of the membrane around the cell
4) carbohydrate that is absorbed by cells

48) Which concept is *best* illustrated in the flowchart below?



1) genetic manipulation
2) dynamic equilibrium
3) material cycles
4) natural selection

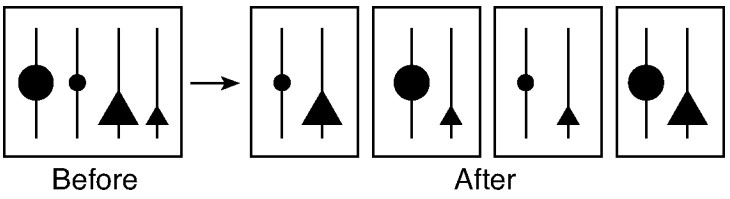
49) The diagram below represents four different species of wild birds. Each species has feet with different structural adaptations.



The development of these adaptations can *best* be explained by the concept of

1) natural selection
2) selective breeding
3) inheritance of characteristics acquired after the birds hatched from the egg
4) inheritance of resistance to diseases that affect all these species

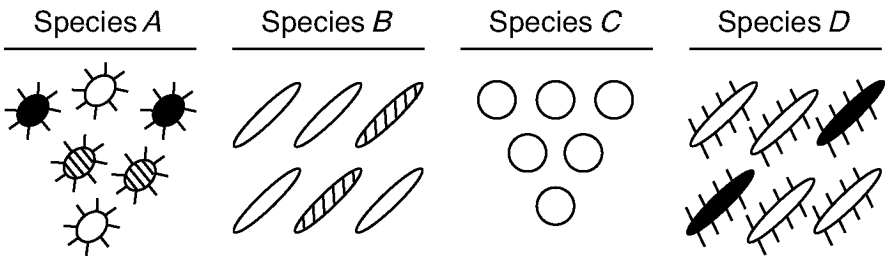
50) The diagram below represents the genetic contents of cells before and after a specific reproductive process.



This process is considered a mechanism of evolution because it

1) increases the number of offspring an organism can produce
2) decreases the chance for new combinations of inheritable traits in a species
3) increases the chance for variations in offspring
4) decreases the probability that genes can be passed on to other body cells

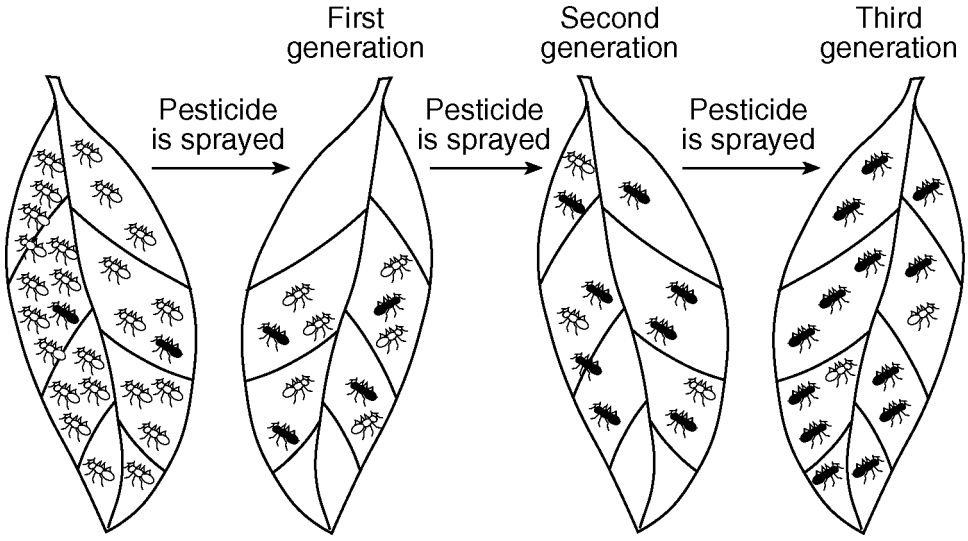
51) The diagram below represents four different species of bacteria.



Which statement is correct concerning the chances of survival for these species if there is a change in the environment?

1) Neither species *B* nor species *D* will survive because they compete for the same resources.
2) None of the species will survive because bacteria reproduce asexually.
3) Species *C* has the best chance of survival because it has no gene mutations.
4) Species *A* has the best chance of survival because it has the most genetic diversity.

52) The diagram below shows the effect of spraying a pesticide on a population of insects over three generations.



What concept is represented in the diagram?

1) survival of the fittest
2) succession
3) dynamic equilibrium
4) extinction

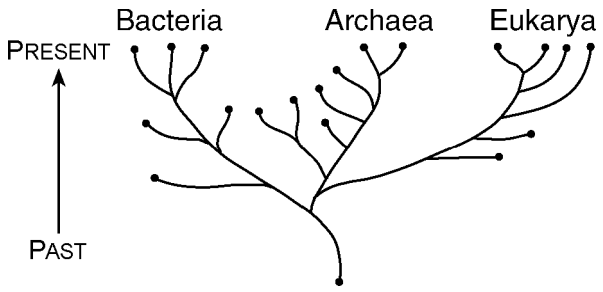
53) The chart below contains a number of characteristics for three different organisms. The characteristics can be used in classifying these organisms.

Characteristics	Organism A	Organism B	Organism C
Number of cells	unicellular	multicellular	unicellular
Type of nutrition	autotrophic	autotrophic	heterotrophic
Nuclear membrane	absent	present	absent
DNA	present	present	present

Which *two* organisms would be expected to have the most similar genetic material? [*Support your answer using information from the chart.*]

TOPIC: EVOLUTION PATHWAYS

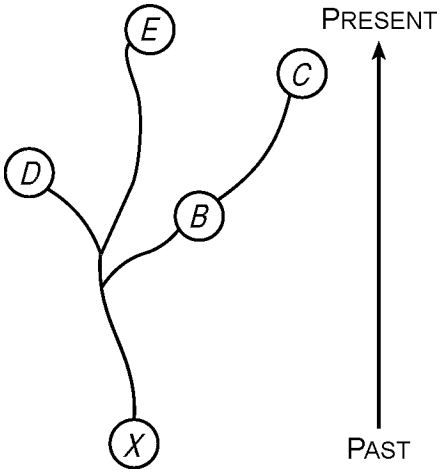
54) A current proposal in the field of classification divides life into three broad categories called domains. This idea is illustrated below.



Which concept is *best* supported by this diagram?

1) All evolutionary pathways are the same length and they all lead to present-day organisms.
2) Evolutionary pathways can proceed in several directions with only some pathways leading to present-day organisms.
3) Evolutionary pathways proceed only in one set direction over a short period of time.
4) All evolutionary pathways will eventually lead to present-day organisms.

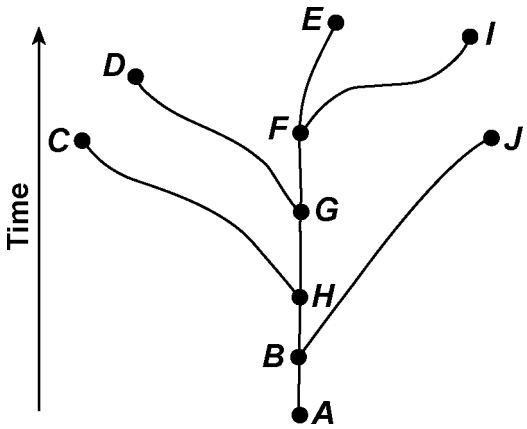
55) The evolutionary pathways of five species are represented in the diagram below.



Which statement is supported by this diagram?

1) Species *X* evolved later than species *D* but before species *B*.
2) Both species *C* and species *D* are related to species *X*.
3) Species *C* is the ancestor of species *B*.
4) Species *D* and *E* evolved from species *B*.

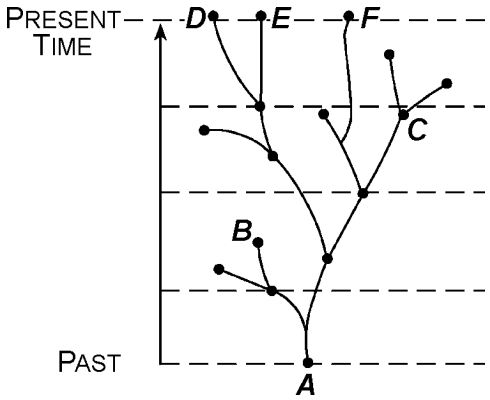
56) The evolutionary pathways of ten different species are represented in the diagram below.



Which two species are the most closely related?

1) *C* and *D*
2) *G* and *J*
3) *A* and *F*
4) *E* and *I*

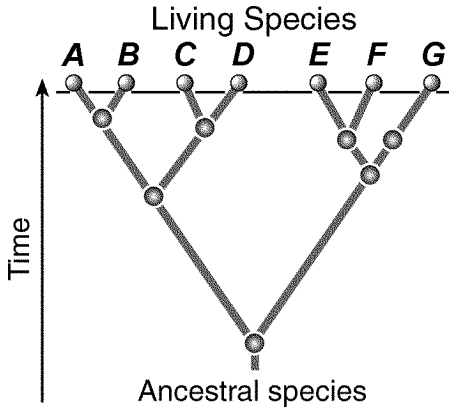
57) The diagram below illustrates possible evolutionary pathways of some species.



Which statement is a valid inference based on the information in the diagram?

1) Species *B* is the ancestor of species *F*.
2) Species *A* is the common ancestor of all life on Earth.
3) Species *D* is more closely related to species *E* than to species *F*.
4) Species *C* is the ancestor of species that exist at the present time.

58) The evolutionary pathways of seven living species are shown in the diagram below.

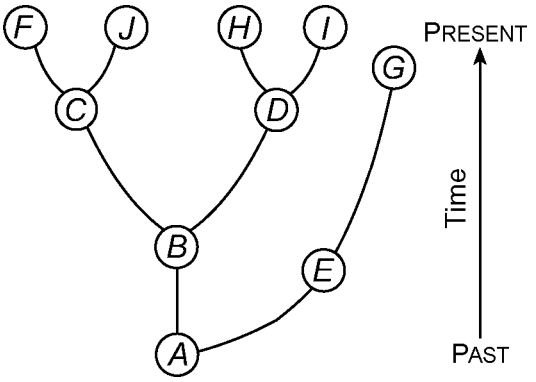


Which two species are likely to have the *most* similar DNA base sequences?

1) *C* and *D*
2) *B* and *G*
3) *E* and *G*
4) *B* and *C*

Questions 59 through 61 refer to the following:

The diagram below shows some evolutionary pathways. Each letter represents a different species.



59) In the diagram shown, which two organisms are most closely related?

1) *A* and *G*
2) *F* and *I*
3) *F* and *H*
4) *G* and *J*

60) In the diagram shown, the *most* recent ancestor of organisms *D* and *F* is

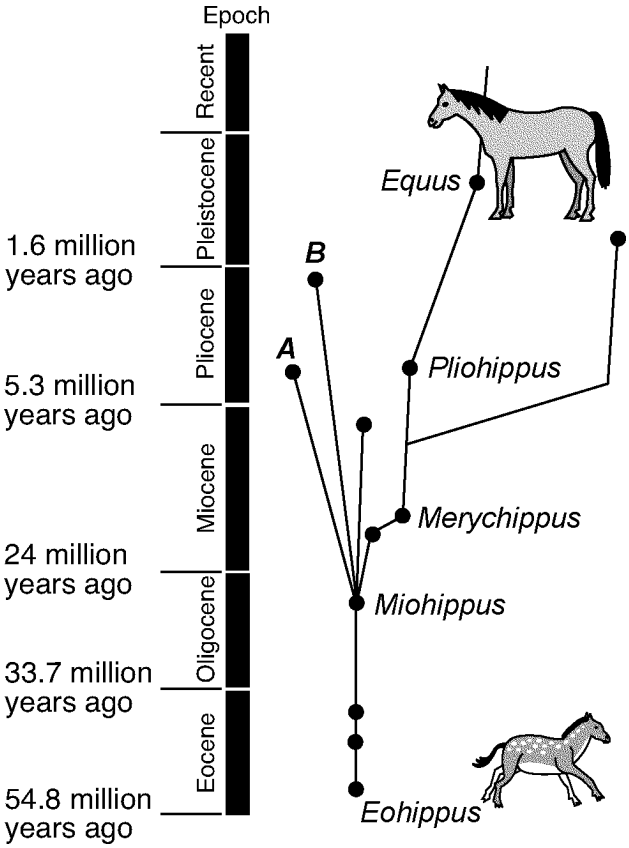
1) *I*
2) *A*
3) *B*
4) *C*

61) In the given diagram, if *A* represents a simple multicellular heterotrophic organism, *B* would most likely represent

1) another type of simple multicellular heterotroph
2) an autotrophic mammal
3) a single-celled photosynthetic organism
4) a complex multicellular virus

Questions 62 and 63 refer to the following:

The diagram below represents possible relationships between animals in the family tree of the modern horse.



62) One possible conclusion that can be drawn regarding ancestral horses *A* and *B* in the diagram shown is that

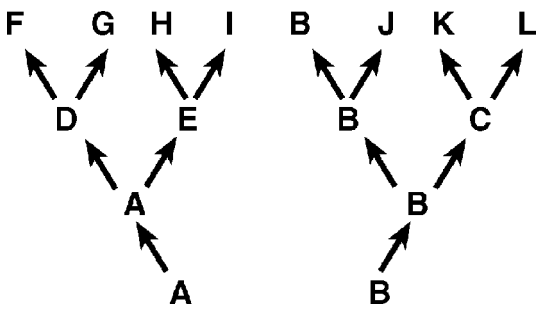
1) *A* was better adapted to changes that occurred during the Pliocene Epoch than was *B*
2) the areas that *B* migrated to contained fewer varieties of producers than did the areas that *A* migrated to
3) the adaptive characteristics present in both *A* and *B* were insufficient for survival
4) competition between *A* and *B* led to the extinction of *Pliohippus*

63) *Miohippus* has been classified as a browser (an animal that feeds on shrubs and trees) while *Merychippus* has been classified as a grazer (an animal that feeds on grasses). Based on the given information and diagram, one valid inference that can be made regarding the evolution of modern horses is that

1) *Equus* evolved as a result of the migration of *Pliohippus* into forested areas due to increased competition
2) *Pliohippus* had teeth adapted for grazing
3) ecological succession led to changes in tooth structure during the Eocene Epoch
4) *Eohippus* inhabited grassland areas throughout the world

Questions 64 through 66 refer to the following:

Letters *A* through *L* represent different species of organisms. The arrows represent long periods of geologic time.



64) Which two species in the diagram shown are the most closely related?

1) *F* and *G*
2) *J* and *L*
3) *G* and *L*
4) *F* and *H*

65) Which species in the diagram shown was *best* adapted to changes that occurred in its environment over the *longest* period of time?

1) *A*
2) *B*
3) *C*
4) *J*

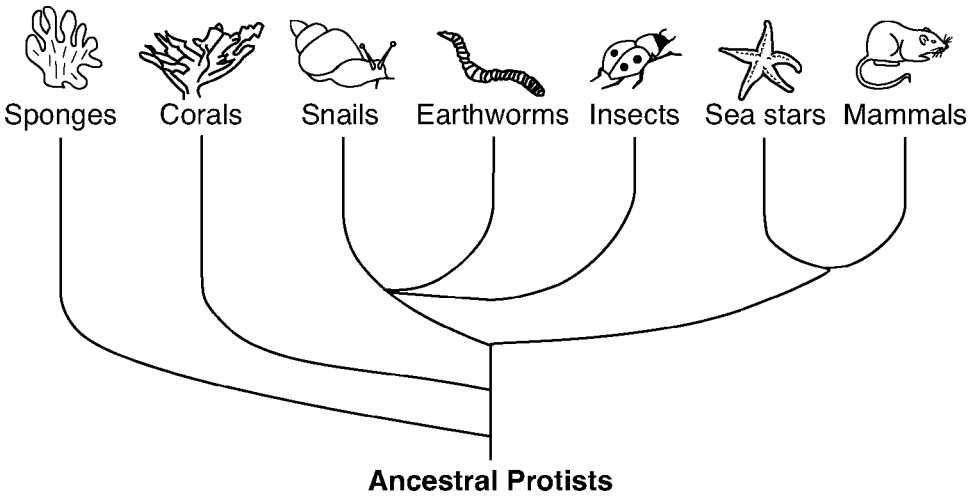
66) Which two species in the diagram shown would most likely show the *greatest* similarity of DNA and proteins?

1) *B* and *J*
2) *F* and *L*
3) *J* and *K*
4) *G* and *I*

67) *R*, *S*, and *T* are three species of birds. Species *S* and *T* show similar coloration. The enzymes found in species *R* and *T* show similarities. Species *R* and *T* also exhibit many of the same behavioral patterns.

Show the relationship between species *R*, *S*, and *T* by placing the letter representing each species at the top of the appropriate branch on the diagram below.

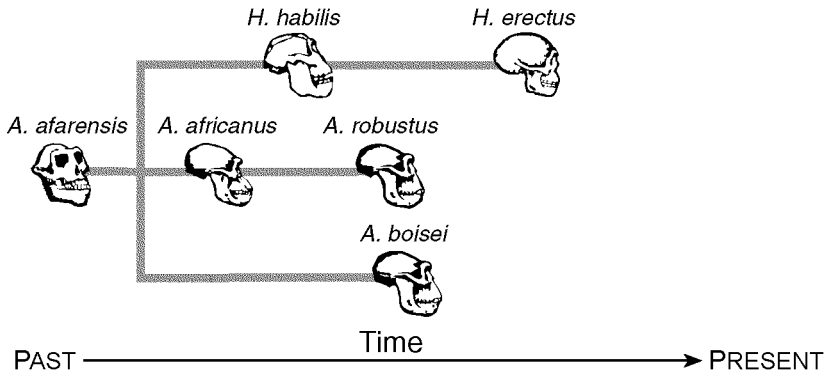
68) The diagram below represents possible evolutionary relationships between groups of organisms.



Which statement is a valid conclusion that can be drawn from the diagram?

1) Sponges were the last new species to appear on Earth.
2) Insects are more complex than mammals.
3) Snails appeared on Earth before corals.
4) Earthworms and sea stars have a common ancestor.

69) According to the diagram below, which three species lived on Earth during the same time period?

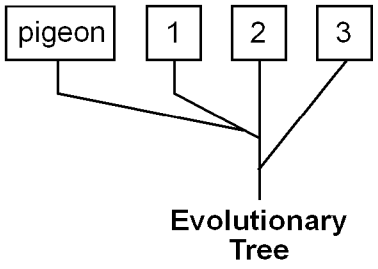


1) *africanus, boisei, erectus*
2) *robustus, africanus, afarenis*
3) *habilis, erectus, afarenis*
4) *habilis, robustus, boisei*

70) Explain why it would be difficult to determine which one of the other three organisms from the table below should be placed in box 1 of the evolutionary tree.

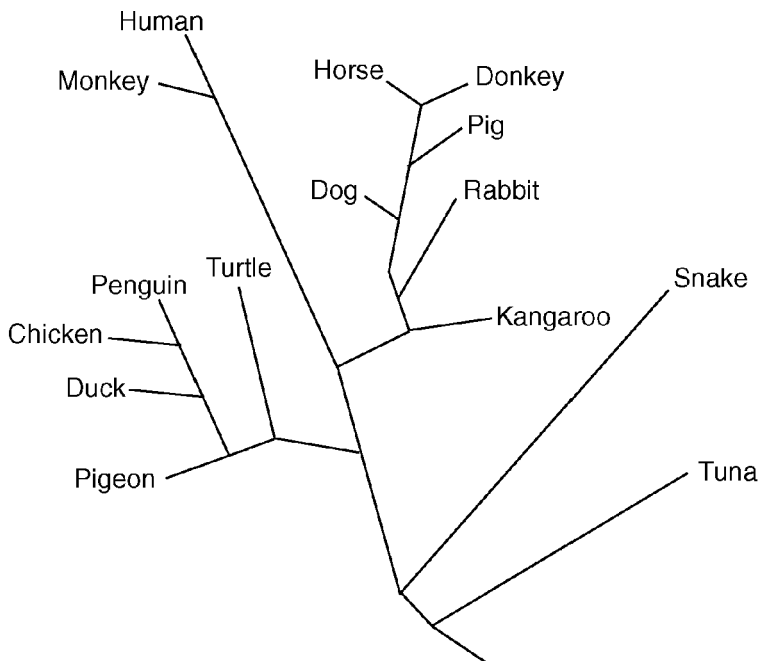
Body Structures and Reproductive Characteristics of Four Organisms

Organism	Body Structures	Reproductive Characteristics
pigeon	feathers, scales, 2 wings, 2 legs	lays eggs
A	scales, 4 legs	lays eggs
B	fur, 2 leathery wings, 2 legs	gives birth to live young, provides milk for offspring
C	fur, 4 legs	lays eggs, provides milk for offspring



Questions 71 through 73 refer to the following:

Based on their analysis of the differences in amino acid sequences of one kind of protein, scientists prepared the evolutionary tree shown below.



71) According to the tree diagram, the DNA of which pair of organisms would show the *greatest* similarity?

1) horse and donkey
2) penguin and turtle
3) snake and tuna
4) turtle and rabbit

72) Older systems of classification always placed penguins, chickens, ducks, and pigeons in the bird group and turtles and snakes in the reptile group. Does the tree diagram shown support the older system of classification? [*Explain your answer.*]

73) According to the tree diagram, is the pig more closely related to the dog or the kangaroo? [*Justify your answer.*]

TOPIC: ECOLOGICAL NICHES AND BEAKS OF FINCHES LAB

74) Cattail plants in freshwater swamps are being replaced by purple loosestrife plants. The two species have very similar environmental requirements. This observation *best* illustrates

1) dynamic equilibrium
2) random recombination
3) competition between species
4) variations within a species

75) Two closely related species of birds live in the same tree. Species *A* feeds on ants and termites, while species *B* feeds on caterpillars. The two species coexist successfully because

1) they use different methods of reproduction
2) each occupies a different niche
3) birds compete for food
4) they interbreed

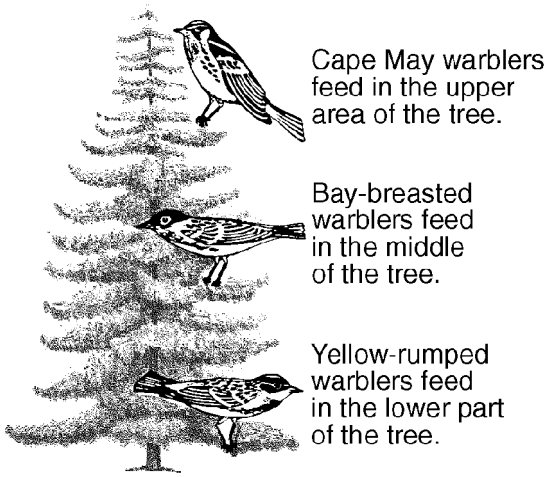
76) Information concerning nests built in the same tree by two different bird species over a ten-year period is shown in the table below.

Distance of Nest Above Ground (m)	Total Number of Nests Built by Two Different Species	
	A	*B*
less than 1	5	0
1–5	10	0
6–10	5	0
over 10	0	20

What inference *best* describes these two bird species?

1) They compete for nesting sites because they nest in the same tree at the same time.
2) They compete for nesting sites because they build the same type of nest.
3) They most likely do not compete for nesting sites because they occupy different niches.
4) They do not compete for nesting sites because they have the same reproductive behavior.

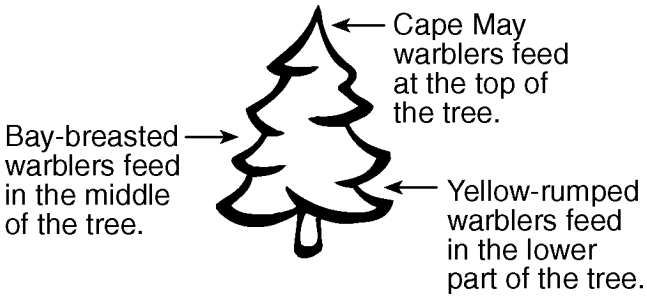
77) The ecological niches of three bird species are shown in the diagram below.



What is the advantage of each bird species having a different niche?

1) More abiotic resources are available for each bird.
2) Predators are less likely to feed on birds in a variety of locations.
3) As the birds feed higher in the tree, available energy increases.
4) There is less competition for food.

78) The feeding niches of three bird species are shown in the diagram below.



What is the advantage of these different feeding niches for the birds?

1) less competition for food
2) fewer biotic resources for each bird species
3) less energy available as the birds feed higher in the tree
4) fewer abiotic resources for each bird species

Questions 79 and 80 refer to the following:

Evolutionary changes have been observed in beak size in a population of medium ground finches in the Galapagos Islands. Given a choice of small and large seeds, the medium ground finch eats mostly small seeds, which are easier to crush. However, during dry years, all seeds are in short supply. Small seeds are quickly consumed, so the birds are left with a diet of large seeds. Studies have shown that this change in diet may be related to an increase in the average size of the beak of the medium ground finch.

79) The most likely explanation for the increase in average beak size of the medium ground finch described in the reading passage is that the
   1) lack of small seeds caused a mutation which resulted in a larger beak
   2) birds interbred with a larger-beaked species and passed on the trait
   3) birds acquired larger beaks due to the added exercise of feeding on large seeds
   4) trait is inherited and birds with larger beaks have greater reproductive success

80) In exceptionally dry years, what most likely happens in the population of medium ground finches mentioned in the reading passage?
   1) There is increased cooperation between the birds.
   2) Birds with large beaks prey on birds with small beaks.
   3) There is increased competition for a limited number of small seeds.
   4) The finches develop parasitic relationships with mammals.

Questions 81 through 83 refer to the following:

When Charles Darwin traveled to the Galapagos Islands, he observed 14 distinct varieties of finches on the islands. Darwin also observed that each finch variety ate a different type of food and lived in a slightly different habitat from the other finches. Darwin concluded that the finches all shared a common ancestor, but had developed different beak structures.

81) The 14 varieties of finches mentioned in the reading passage are most likely the result of
   1) lack of competition
   2) biological evolution
   3) asexual reproduction
   4) absence of biodiversity

82) The different beak structures mentioned in the last sentence of the reading passage were most likely influenced by
   1) environmental conditions identical to those of the common ancestor
   2) abnormal mitotic cell division
   3) characteristics that are acquired during the bird's lifetime
   4) selection for favorable variations

83) The second sentence in the reading passage *best* describes
   1) an ecosystem
   2) a niche
   3) a food web
   4) a predator/prey relationship

84) Even though the finches on the various Galapagos Islands require different biotic and abiotic factors for their survival, these finches would most likely be grouped in the same
   1) species, but found in different habitats
   2) population, but found in different ecosystems
   3) species and found in the same biosphere
   4) kingdom, but found in different ecological niches

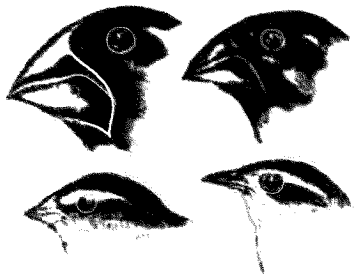
85) Galapagos finches evolved partly due to
   1) cloning and recombination
   2) variation and competition
   3) mutation and asexual reproduction
   4) migration and selective breeding

86) Beak structures differ between individuals of one species of bird. These differences most likely indicate
   1) the presence of a variety of food sources
   2) a reduced rate of reproduction
   3) an abundance of predators
   4) a large supply of one kind of food

87) In members of a bird species living on a remote island, the *greatest* number of beak variations in the population would most likely be found when
   1) there is a high level of competition for limited resources
   2) they have a large and varied food supply
   3) they are prey for a large number of predators
   4) homeostasis is limited by a severe climate

88) The different tools used during the "beaks of finches" lab represented
   1) variations in ecosystems
   2) variations in seed size
   3) feeding adaptations in finches
   4) nest construction adaptations

89) Researchers discovered four different species of finches on one of the Galapagos Islands. DNA analysis showed that these four species, shown in the illustration below, are closely related even though they vary in beak shape and size. It is thought that they share a common ancestor.



Which factor most likely influenced these differences in beak size and shape?

1) Birds with successful beak adaptations obtained food and survived to have offspring.
2) Birds with poorly adapted beaks changed their beaks to get food.
3) Birds with yellow beaks were able to hide better from predators.
4) Birds with large, sharp beaks become dominant.

Questions 90 and 91 refer to the following:

Dietary Preferences of Finches

Species of Finch	Preferred Foods
A	nuts and seeds
B	worms and insects
C	fruits and seeds
D	insects and seeds
E	nuts and seeds

90) Based on its preferred food, species *B* in the given table would be classified as a

1) parasite
2) decomposer
3) producer
4) carnivore

91) Which two species in the given table would most likely be able to live in the same habitat without competing with each other for food?

1) *B* and *C*
2) *C* and *E*
3) *A* and *C*
4) *B* and *D*

Questions 92 and 93 refer to the following:

In birds, the ability to crush and eat seeds is related to the size, shape, and thickness of the beak. Birds with larger, thicker beaks are better adapted to crush and open seeds that are larger.

One species of bird found in the Galapagos Islands is the medium ground finch. It is easier for most of the medium ground finches to pick up and crack open smaller seeds rather than larger seeds. When food is scarce, some of the birds have been observed eating larger seeds.

92) Based on the reading passage, describe *one* change in beak characteristics that would most likely occur in the medium ground finch population after many generations when an environmental change results in a permanent shortage of small seeds.

93) Explain the long-term change in beak characteristics of the Galapagos ground finches described due to scarcity of smaller seeds. Use the concepts of:

- competition
- survival of the fittest
- inheritance

Questions 94 through 96 refer to the following:

In the *Beaks of Finches* laboratory activity, students were each assigned a tool to use to pick up seeds. In round one, students acting as birds used their assigned tools to pick up small seeds from their own large dishes (the environment) and place them in smaller dishes (their stomachs). The seeds collected by each student were counted. Some students were able to collect many seeds, while others collected just a few.

In round two, students again used their assigned tools to collect seeds. This time several students were picking up seeds from the same dish of seeds.

94) One factor that influences the evolution of a species that was *not* part of the laboratory activity described is

1) variation
2) overproduction
3) struggle for survival
4) competition

95) Explain how the laboratory activity described illustrates the process of natural selection.

96) Identify *one* trait, other than beak characteristics, that could contribute to the ability of a finch to feed successfully.

97) A scientist studied iguanas inhabiting a chain of small ocean islands. He discovered two species that live in different habitats and display different behaviors. His observations are listed in the table below.

Observations of Two Species of Iguanas

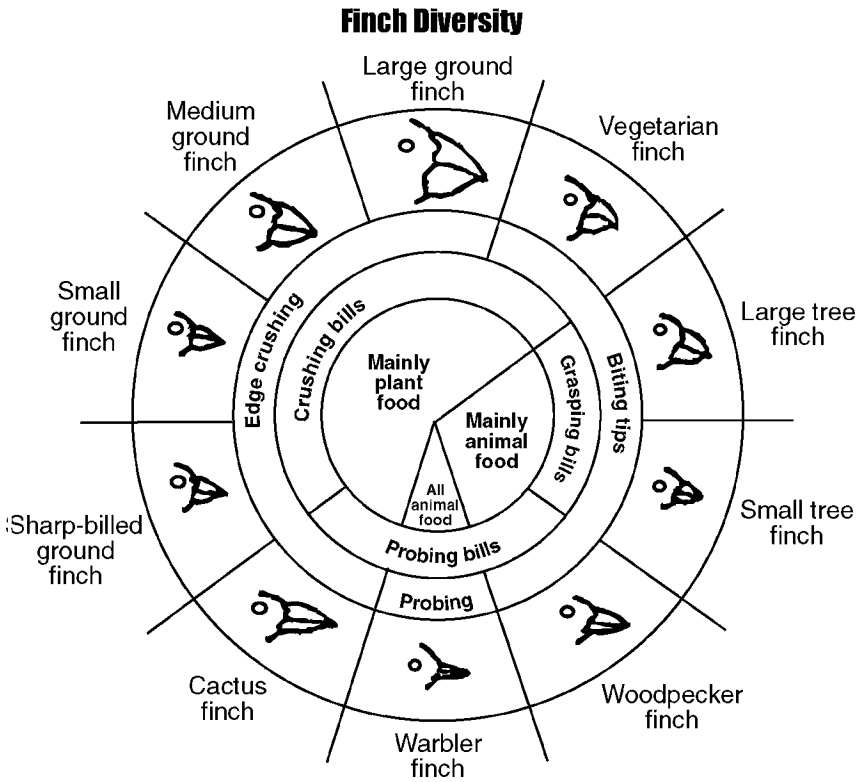
Species *A*	Species *B*
spends most of its time in the ocean	spends most of its time on land
is rarely found more than 10 meters from shore	is found many meters inland from shore
eats algae	eats cactus and other land plants

Which of the following statements *best* describes these two species of iguanas?

1) The two species can interbreed.
2) Species *A* is a scavenger and species *B* is a carnivore.
3) Both species evolved through the process of ecological succession.
4) Each species occupies a different niche.

Questions 98 through 104 refer to the following:

The finch diversity chart below contains information concerning the finches found on the Galapagos Islands.



98) Which factor most directly influenced the evolution of the diverse types of beaks of the finches shown in the diagram?

1) oceanic storms
2) predation by humans
3) available food sources
4) lack of available niches

99) State *one* reason why the large tree finch and the large ground finch in the given diagram are able to coexist on the same island.

100) State the name of *one* species of finch from the diagram shown that is most likely to compete with the small tree finch if they lived on the same island. [*Support your answer with an explanation.*]

101) Identify *one* trait, other than beak characteristics, that would contribute to the survival of a finch species and state one way this trait contributes to the success of this species.

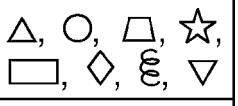
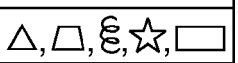
102) Identify *one* bird on the given chart that would most likely compete for food with the large tree finch. [*Support your answer.*]

103) Using information given in the chart, identify *two* birds that would most likely compete for food in times of food shortage and explain why they would compete.

104) The cactus finch, warbler finch, and woodpecker finch all live on one island. Based on the information in the given chart, which one of these finches is least likely to compete with the other two for food? [*Support your answer with an explanation.*]

TOPIC: DICHOTOMOUS KEYS

105) A classification system is shown in the table below.

Classification	Examples
Kingdom — animal	
Phylum — chordata	
Genus — *Felis*	
Species — *domestica*	

This classification scheme indicates that  is most closely related to

1) 

3) 

2) 

4) 

Questions 106 through 108 refer to the following:

A student observed the physical characteristics of seven organisms and prepared the data table below.

Organism Comparison

Organism	Internal Skeleton Present	Legs Present	Wings Present	Fur Present	Moist Body Covering Present
Earthworm	no	no	no	no	yes
Fish	yes	no	no	no	yes
Fly	no	yes	yes	no	no
Gorilla	yes	yes	no	yes	no
Jellyfish	no	no	no	no	yes
Parrot	yes	yes	yes	no	no
Snake	yes	no	no	no	no

One of the student's classmates sorted the seven organisms into two groups as shown below.

Group 1	Group 2
fly parrot	earthworm gorilla snake fish jellyfish

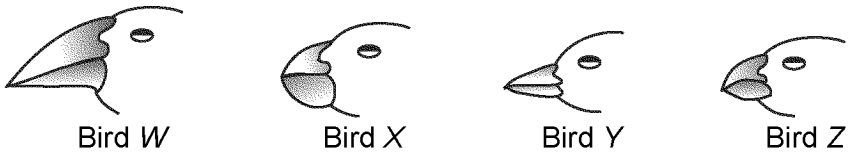
106) Which characteristic from the data table shown did the student use to group the organisms?

107) Another classmate suggested that the earthworm is more closely related to the jellyfish than to any other organism observed. State the evidence from the data table shown that the student most likely used for this suggested relationship.

108) According to the data table shown, fish and snakes are very different organisms, yet they have many similarities. Provide a biological explanation for the fact that fish and snakes have so many characteristics in common.

Questions 109 through 112 refer to the following:

The dichotomous key shown below can be used to identify birds *W*, *X*, *Y*, and *Z*.



Dichotomous Key to Representative Birds

1. a. The beak is relatively long and slender.....*Certhidea*
   b. The beak is relatively stout and heavy.....go to 2
2. a. The bottom surface of the lower beak is flat and straight .....*Geospiza*
   b. The bottom surface of the lower beak is curved .....go to 3
3. a. The lower edge of the upper beak has a distinct bend .....*Camarhynchus*
   b. The lower edge of the upper beak is mostly flat .....*Platyspiza*

109) Assuming that bird *W*'s beak, in the dichotomous key shown, is classified as "stout and heavy", other characteristics of this bird's beak would lead you to believe that it is

1) *Platyspiza*
2) *Certhidea*
3) *Camarhynchus*
4) *Geospiza*

110) According to the dichotomous key, bird *X* is most likely

1) *Geospiza*
2) *Certhidea*
3) *Platyspiza*
4) *Camarhynchus*

111) According to the dichotomous key, bird *Y* is most probably classified as

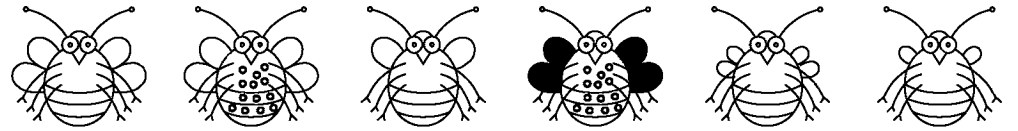
1) *Camarhynchus*
2) *Geospiza*
3) *Platyspiza*
4) *Certhidea*

112) According to the dichotomous key, bird *Z* most likely classified as what species?

1) *Platyspiza*
2) *Certhidea*
3) *Camarhynchus*
4) *Geospiza*

Questions 113 and 114 refer to the following:

The diagram below represents six insect species. A dichotomous key to these six species is given.



Species ___ Species *E* Species ___ Species *F* Species ___ Species ___

DICHOTOMOUS KEY:

1. a. has small wings .....go to 2
   b. has large wings.....go to 3
2. a. has a single pair of wings.....Species *A*
   b. has a double pair of wings .....Species *B*
3. a. has a double pair of wings .....go to 4
   b. has a single pair of wings.....Species *C*
4. a. has spots .....go to 5
   b. does not have spots.....Species *D*
5. a. _____.....Species *E*
   b. _____.....Species *F*

113) Complete the missing information for sections 5.a. and 5.b. in the given dichotomous key so that it is complete for all six species.

114) Use the given dichotomous key to identify the drawings of species *A*, *B*, *C*, and *D*. Place the letter of each species on the line located below the drawing of the species.