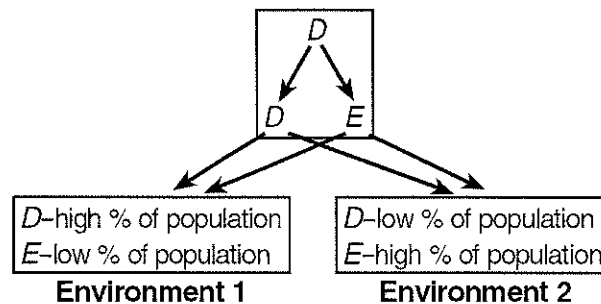


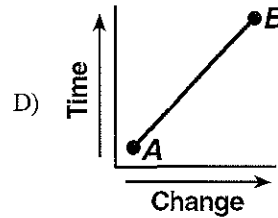
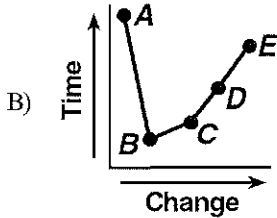
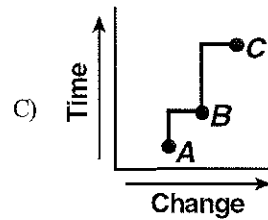
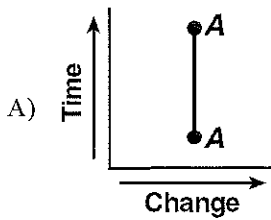
3rd Quarter Practice Test

- 1) Genetic variations are the raw material for evolution. These variations cannot be acted upon by natural selection factors unless they
 - A) are found in fossil records of the population
 - B) produce only favorable characteristics
 - C) produce only unfavorable characteristics
 - D) are in the phenotype of the organism
- 2) Which concept was *not* included in Darwin's theory of evolution?
 - A) struggle for survival between organisms
 - B) sorting out and recombination of genes
 - C) production of more offspring than can survive
 - D) development of new species from a common ancestor
- 3) According to Charles Darwin, one factor that affects the evolution of a species is
 - A) rapid fossil formation
 - B) exposure to environmental pollutants
 - C) survival of the fittest
 - D) variation due to genetic mutations
- 4) A population, *D*, produces a mutant variety, *E*. After many generations, equal numbers of varieties *D* and *E* migrate to environments 1 and 2. The diagram below shows the relative percentages of populations *D* and *E* in environments 1 and 2 after several generations.



- This difference in relative population size is an example of the
- A) modern evolutionary concept of natural selection
 - B) Darwinian concept that mutations cause changes in populations
 - C) concept of the transmission of acquired characteristics
 - D) time-frame concept involved in punctuated equilibrium
- 5) The structural changes that occurred in certain plants over time, enabling them to thrive in dry habitats, are examples of
 - A) energy-flow relationships
 - B) nutritional relationships
 - C) succession
 - D) adaptations
 - 6) In the 1870's, August Weismann performed an experiment in which he cut off the tails of over 20 generations of mice. He observed that each new generation had tails of normal length. This experiment helped to discredit the possibility of
 - A) the inheritance of acquired characteristics
 - B) the segregation and recombination of alleles
 - C) artificial selection and survival of the fittest
 - D) reproduction of abnormal cells
 - 7) Which concept states that species have long periods of stability interrupted by geologically brief periods of significant change during which new species may evolve?
 - A) punctuated equilibrium
 - B) gradualism
 - C) competition
 - D) geographic isolation

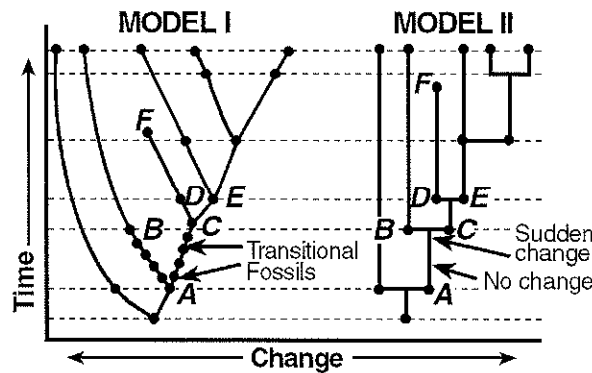
8) Each lettered point in the graphs below represents a species. Which graph *best* represents the concept of punctuated equilibrium?



9) Scientists have attempted to explain the rate of evolution by means of

- A) use and disuse
- B) gradualism and punctuated equilibrium
- C) geographic and reproductive isolation
- D) the heterotroph hypothesis

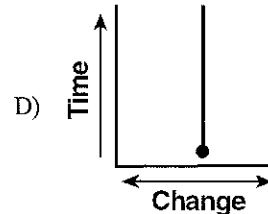
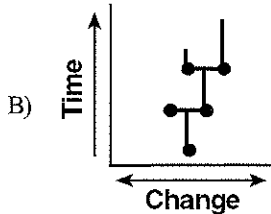
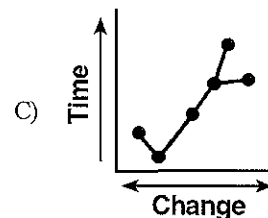
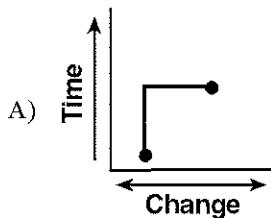
10) Models *I* and *II* in the graph below show two different evolutionary pathways.



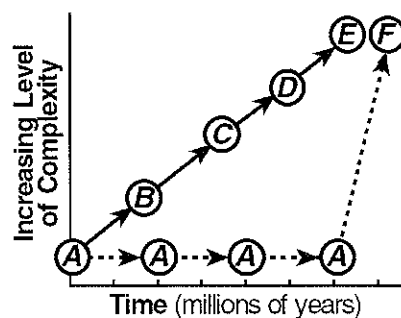
Which evolutionary concepts are *best* represented by model *I* and model *II*?

- A) Model *I* represents gradualism; model *II* represents punctuated equilibrium.
- B) Model *I* represents acquired characteristics; model *II* represents speciation.
- C) Model *I* represents punctuated equilibrium; model *II* represents gradualism.
- D) Model *I* represents speciation; model *II* represents acquired characteristics.

11) Each point in the graphs below represents a new species. Which graph *best* represents the concept of gradualism?

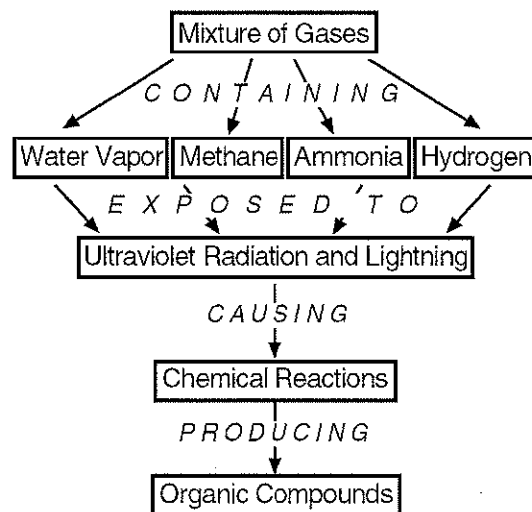


- 12) Letters *A* through *F* on the graph below represent different species that are related but show different structural, functional, and behavioral adaptations.



One inference that can be drawn from the graph is that

- A) species *E* is the ancestor of species *F*
 B) species *E* resulted from the extinction of species *A*, *B*, *C*, and *D*
 C) speciation occurs only gradually, over long periods of time
 D) speciation may be either gradual or abrupt
- 13) Which factor may have played a role in the development of the polar bear in Alaska and the brown bear in Russia into separate species?
- A) mitotic cell division
 B) artificial selection
 C) asexual reproduction
 D) geographic isolation
- 14) Which concept is represented in the diagram below?

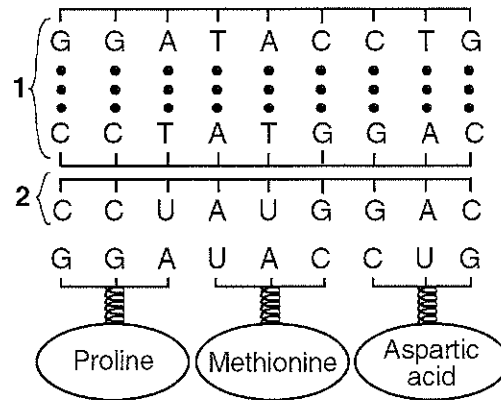


- A) theory of natural selection
 B) heterotroph hypothesis
 C) use and disuse
 D) gene-chromosome theory
- 15) What is a definition of the term "gene"?
- A) a transfer-RNA nucleotide sequence specific for a particular amino acid
 B) three messenger-RNA nucleotides coded for a specific amino acid
 C) a sequence of nucleotides that directs the synthesis of a product, such as a protein
 D) the number of nitrogenous bases in a nucleotide
- 16) Choose the type of nucleic acid molecule that is *best* described by the given phrase.

May contain adenine, cytosine, guanine, and thymine

- A) DNA molecules, only
 B) Neither DNA nor RNA molecules
 C) Both DNA and RNA molecules
 D) RNA molecules, only

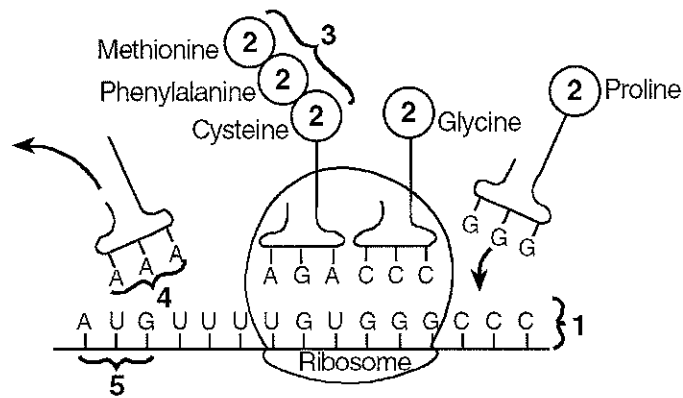
17) The diagram below represents molecular structures involved in protein synthesis.



Structure 1 represents

- A) a portion of an RNA molecule
- B) part of a polypeptide chain
- C) a portion of a DNA molecule
- D) the building blocks of proteins

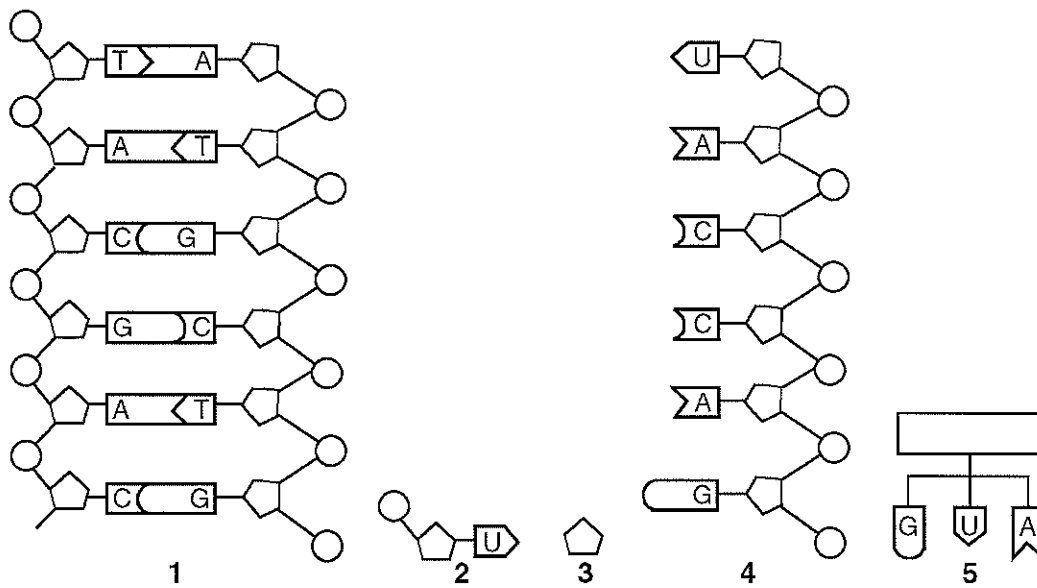
18)



A single codon is indicated by number

- A) 1
- B) 5
- C) 3
- D) 4

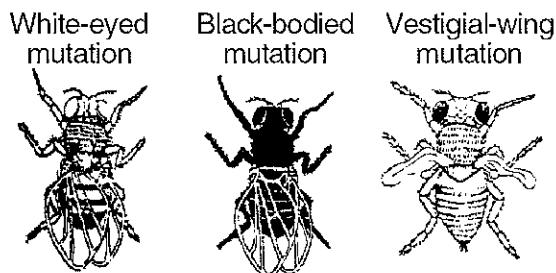
19)



Which nucleic acid component is initially affected by a gene mutation?

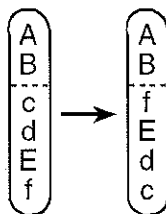
- A) 1
- B) 2
- C) 3
- D) 4
- E) 5

- 20) The diagram below illustrates differences that occur in fruit flies.



These differences could have been caused by

- A) the substitution of uracil for thymine in RNA
 B) hydrogen bonds breaking in the process of DNA replication
 C) the substitution of ribose for deoxyribose in RNA
 D) random errors occurring in the process of DNA replication
- 21) The diagram below illustrates the results of random breakage and recombination of genetic material.



The process illustrated in the diagram is an example of

- A) segregation
 B) a chromosomal alteration
 C) synapsis
 D) a single gene mutation
- 22) In individuals with PKU, a buildup of phenylalanine can damage the brain, causing mental retardation. Foods containing the artificial sweetener aspartame carry a warning to people with PKU. One possible reason for this special warning label is that
- A) aspartame contains phenylalanine
 B) artificial sweeteners inhibit phenylalanine production
 C) PKU is common in prepackaged foods
 D) phenylalanine slows the effect of mental retardation
- 23) Which disorder is characterized by fragile red blood cells and severe pain from blocked blood vessels?
- A) phenylketonuria
 B) hemophilia
 C) sickle-cell anemia
 D) Tay-Sachs

Questions 24 and 25 refer to the following:

For many generations, a particular species of snail has lived in an isolated pond. Some members of the species have light-colored shells and some have dark-colored shells. During this time, the species has been producing large numbers of offspring through random mating, and no migration has occurred.

- 24) The total of all the inheritable genes found in these snails is referred to as a
- A) pedigree
 B) gene pool
 C) karyotype
 D) phenotypic ratio
- 25) A change in the environment of the pond caused the light-colored shells to become an important survival trait, and the number of light-colored snails increased. This situation will most likely cause
- A) an increase in the number of ribosomes in the cells of the snail
 B) a change in the frequency of the genes for shell color
 C) the extinction of this species of snail
 D) the addition of a fifth nitrogenous base to the DNA of the snails

- 26) Many squirrels in the city of Syracuse are black, rather than the typical gray. This coloration is due to the presence of a gene that codes for the production of more melanin than is produced in gray squirrels.

Calculating the relative percentages of black and gray squirrels and predicting how these percentages may change in future generations would be an investigation in the field of

- A) genetic engineering
B) cytology
C) biotechnology
D) population genetics
- 27) The Hardy-Weinberg principle would most likely be used in a study of
- A) population genetics
B) endocrine regulation
C) ecological succession
D) embryological development
- 28) According to the Hardy-Weinberg principle, which factor occurring in a population would cause a change in the gene pool?
- A) migration
B) random mating
C) an increased mutation rate
D) maintenance of a large population
- 29) The gene pool of a large population of organisms living on an isolated island was analyzed for gene frequencies. The gene pool of this population was analyzed 25 years later. The gene frequencies were found to be the same. Which factor would most likely have contributed to the population's stability?
- A) random mating
B) migrations of individuals into the population
C) random mutations
D) a reduction in population size
- 30) A gene pool is unstable over a period of time. The most likely result of this situation would be
- A) a tendency for the population to remain unchanged
B) an increase in asexual reproduction
C) a change in frequency of population genotypes
D) a decrease in asexual reproduction

31) **NGORONGORO LIONS**

Scientists in Africa have been studying the lion population of the Ngorongoro Crater, one of the world's largest volcanic craters. It is more than 10 miles across, and the distance from the crater floor to its surrounding peaks is approximately 5,000 feet. The crater's 100-square-mile floor has ideal conditions for large numbers of wildebeests and zebras. At the start of the study, nearly 100 lions lived on the crater floor, but only about 30 of these were adults of breeding age. The crater is surrounded by the 9,650-square-mile Serengeti Plain, which has some 3,000 lions.

There are a number of trails leading in and out of the crater. However, lions rarely leave the crater because of the abundant food supply, and those that attempt to enter the crater are driven out by "coalitions" of males that rule the family groups, known as prides.

In 1962, because of heavy rains, the bloodsucking fly *Stomoxys calcitrans* was able to breed constantly for over 6 months. There were so many flies that most of the lions in the crater became covered with open, oozing sores and became so ill they were no longer able to hunt. By the time the rains stopped, the population of lions was estimated to be about 10. This created a "population bottleneck," a situation in which there is a very small gene pool with very few mating partners.

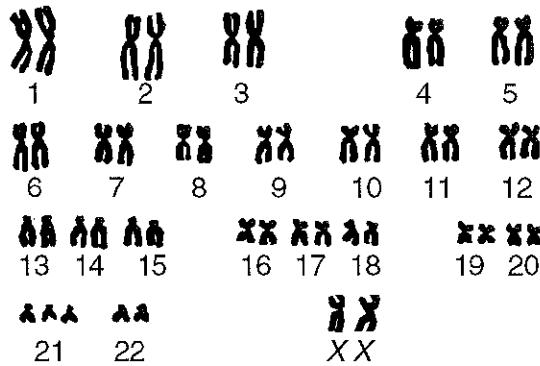
By 1972, the lion population had returned to its former level. Scientists were able to determine that the entire crater population of today is descended from four females that survived the plague of flies, and four males. One or more of the males may have entered the crater from the outside, since there were too few adult males to drive out any invaders.

Scientists estimate that the crater lions have lost about 10% of their genetic diversity over the last 20 years. In comparison to the Serengeti lions, the crater lions have lower reproductive rates, twice as many abnormal sperm in semen samples, and a weakened immune system.

The reproductive abnormalities in today's population of Ngorongoro lions are most likely the result of

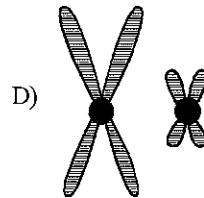
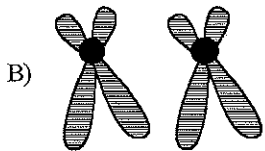
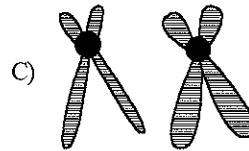
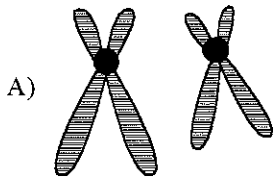
- A) polyploidy
B) nondisjunction
C) crossing-over
D) inbreeding

- 32) A karyotype is shown in the diagram below.



Information in this karyotype indicates that the individual is a

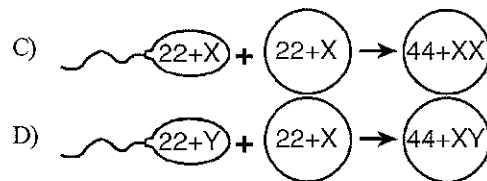
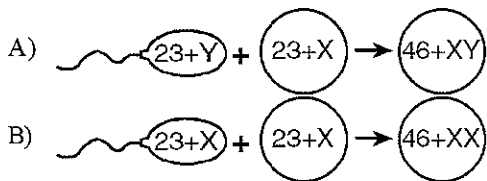
- A) male with Tay-Sachs disease
 B) male with phenylketonuria
 C) female with sickle-cell anemia
 D) female with Down syndrome
- 33) Which diagram represents a pair of homologous chromosomes?



- 34) A normal human egg cell contains

- A) 44 autosomes and XX-chromosomes
 B) 44 autosomes and XY-chromosomes
 C) 22 autosomes and one X-chromosome
 D) 22 autosomes and one Y-chromosome

- 35) Which diagram *best* represents the formation of a zygote that could develop into a normal human male?



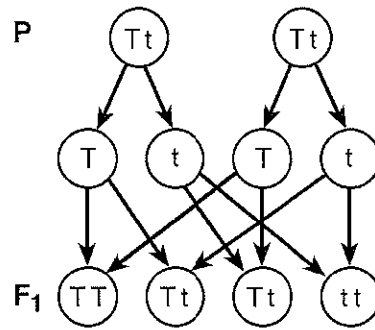
- 36) Mendel developed his basic principles of heredity by

- A) breeding experiments with drosophila
 B) mathematical analysis of the offspring of pea plants
 C) ultracentrifugation studies of cell organelles
 D) microscopic study of chromosomes and genes

- 37) When red-flowered snapdragons are crossed with white-flowered snapdragons, all the F_1 plants will have pink flowers. If Mendel had used snapdragons instead of pea plants, he would have had difficulty in formulating his principle of

- A) multiple alleles
 B) mutation
 C) dominance
 D) sex-linked traits

38) Which two processes are illustrated by the diagram below?



- A) oogenesis and cleavage
 B) gene linkage and crossing-over
 C) nondisjunction and independent assortment
 D) segregation and recombination
- 39) Traits that are controlled by genes found on an X-chromosome are said to be
- A) autosomal dominant
 B) sex-linked
 C) autosomal recessive
 D) codominant
- 40) In humans, multiple alleles are involved in the inheritance of
- A) certain blood types
 B) Down's syndrome
 C) sex chromosomes
 D) sickle-cell anemia